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ORIGINAL ARTICLE

Incidence and risk stratification of caller noncompliance with dispatcher instructions for cardiopulmonary resuscitation

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Abstract

Aim: This study aimed to describe the incidence of, identify risk factors for, and develop a simple risk-scoring model for cases where callers fail to follow dispatcher instructions regarding cardiopulmonary resuscitation (CPR) for out-of-hospital cardiac arrest.

Methods: Using the Tokyo Fire Department's database, cases of out-of-hospital cardiac arrest in adults where callers received dispatcher instructions regarding CPR between 1 January 2018 and 31 December 2022 were identified. Factors associated with noncompliance with CPR instructions were determined using multivariable logistic regression analysis. A simple scoring model was developed to stratify the caller noncompliance probability.

Results: Overall, 19,525 cases were included. Bystander CPR was not provided in 11,443 (58.6%) of these cases; the 1-month favorable neurological outcome rate was significantly lower in this group (1.1% vs. 2.2%, $p < 0.001$). Regression analysis revealed that patient age, male patient sex, emergency call at night, cardiac arrest in the bathroom, and a familial relationship between the caller and the patient were significantly associated with noncompliance. The scoring model assigned 1 point for each of the following criteria: patient aged ≥65 years, familial relationship between the caller and the patient, and cardiac arrest in the bathroom. It also stratified caller noncompliance probability, with scores of 0, 1, 2, and 3 corresponding to probabilities of 48.0%, 50.8%, 61.3%, and 70.5%, respectively.

Conclusion: We found that callers frequently did not follow dispatcher CPR instructions and identified risk factors for caller noncompliance. Furthermore, the simple scoring model developed effectively stratified the probability of caller noncompliance associated with dispatcher instructions.

KEYWORDS

bystander, cardiopulmonary resuscitation, dispatcher instruction, out-of-hospital cardiac arrest, risk factor

INTRODUCTION

Out-of-hospital cardiac arrest (OHCA) is a global public health concern. Its reported incidence is 30–140 per 100,000 person-years,[1–4] and the 1-month survival rate is as low as 10.7%.[5] Early bystander cardiopulmonary resuscitation (CPR) is crucial to increase survival after OHCA.[6–9] However, bystander CPR is only provided in approximately half of OHCA cases.[1,8]

Telecommunicators of emergency medical services (EMS) play a crucial role as the first point of contact for lay callers and have important opportunities to identify cardiac arrests

and facilitate bystander CPR via telephone. Previous studies have shown that dispatcher instruction regarding CPR improves the probability of bystander CPR, survival, and neurological outcome.[9,10] However, callers often decline CPR instructions or sometimes do not complete CPR even after initially accepting the instructions.[10,11] Some studies have identified obstacles to providing bystander CPR, such as physical inability to perform CPR,[12,13] emotional distress,[11] and fear of liability.[10]

In contrast to the accumulating evidence regarding the ground-level barriers that influence bystander compliance with dispatcher CPR instructions, little is known about the patient characteristics associated with compliance. Analysis of relevant large datasets could elucidate the quantitative relationships between various risk factors and offer insight that can guide strategies to increase lay rescuer CPR. This study aimed to (1) elucidate the incidence of caller noncompliance with dispatcher instructions regarding CPR, (2) identify risk factors for noncompliance, and (3) develop a simple scoring model to stratify patients based on noncompliance probability using a large population-based OHCA registry.

MATERIALS AND METHODS

Study design

This observational study used data from the Tokyo Fire Department database, which contains population-based records of OHCAs, between 1 January 2018 and December. The reporting adhered to the Strengthening the Reporting of Observational Studies in Epidemiology guidelines.[14] This study was conducted in accordance with the 1975 Declaration of Helsinki (as revised in Fortaleza, Brazil, October 2013). The Metropolitan Bokutoh Hospital Institutional Ethics Committee approved the study (approval number 05-095) and waived the requirement for informed consent because the data were anonymized before analysis.

EMS in Tokyo

The Tokyo Fire Department oversees most of Tokyo, except Inagi City and the Tokyo islands, covering an area of 1769 km^2 and approximately 15.8 million individuals. EMS providers instruct and perform CPR according to Japanese guidelines consistent with the International Consensus on Cardiopulmonary Resuscitation and Emergency Cardiovascular Care Science with Treatment Recommendations.[7] Emergency medical telephone communicators at two dispatch centers answer all emergency calls from the public. They assess the situation and provide life-saving instructions via phone before EMS personnel arrive at the scene. The ambulance crew consists of three staff members, including one life-saving technician who conducts a prearrival call en route. They communicate with the caller, gather information about the situation, and provide CPR instructions when a cardiac arrest is recognized. During the study period, EMS personnel instructed the caller on performing chest compression-only CPR in adults.

Data source

The Tokyo Fire Department database collects data on individuals who experience OHCA, is resuscitated by EMS personnel, and is transferred to hospitals. Data collected include age and sex, location of cardiac arrest, whether the cardiac arrest was witnessed by the caller, presence and content of dispatcher instructions to the caller, time of emergency call, time of CPR initiation by a bystander, time of EMS provider arrival at the scene, prehospital return of spontaneous circulation, 1-month survival rate, and neurological status. The time of emergency calls is recorded according to the clock used by the EMS system, whereas the time of CPR initiation by a bystander is determined by the EMS personnel interviewing the bystander. All survivors are followed up by EMS personnel for 1 month after cardiac arrest, and neurological status is determined by the physician responsible for the patient's care using the Cerebral Performance Category scale (category 1, good cerebral performance; category 2, moderate cerebral disability; category 3, severe cerebral disability; category 4, coma or vegetative state; and category 5, death).[15] Information is collected by EMS personnel and uploaded to the registry on the Tokyo Fire Department database server. Uploaded data are checked for consistency, and incomplete data forms are returned to the responsible EMS personnel for correction.

Study population

Patients aged ≥18 years who had experienced OHCA, were resuscitated, and were transported to hospitals by EMS were identified from the Tokyo Fire Department database. Of these, cases in which callers were lay rescuers of cardiac arrest, and CPR instructions were provided by EMS telecommunicators via phone were included. Cases in which bystander CPR was initiated before the emergency call were excluded. Because this was an observational study using an existing data set, a sample size calculation was not performed, and as many cases as possible were included.

Outcomes and variables

The primary outcome was noncompliance with the telecommunication instructions on CPR. The secondary outcomes were favorable neurological outcomes and 1-month survival rate. A favorable neurological outcome was defined as a Cerebral Performance Category scale score of 1 or 2.

Age was categorized as 18–34, 35–49, 50–64, 65–79, and ≥80 years.[16] Time of emergency call was categorized

as 0700–1459, 1500–2259, and 2300–0659 h.[17] Location of cardiac arrest was classified as bathroom, living room or bedroom, and other. Caller relationship with patient was categorized as family member, healthcare provider, and other.

Statistical analysis

Continuous variables are presented as medians and interquartile ranges and were compared using the Mann–Whitney *U* test. Categorical variables are presented as numbers and percentages and were compared using the chi-squared test.

Multivariable logistic regression analysis was used to determine factors associated with caller noncompliance with dispatcher CPR instructions. Adjusted odds ratios and 95% confidence intervals (CIs) were calculated. Covariates included in the model were determined before analysis based on scientific knowledge and clinical plausibility.[11,18,19] They included patient age and sex, emergency call time, location of cardiac arrest, caller's relationship with the patient, and whether the cardiac arrest was witnessed by the caller. To stratify the probability of noncompliance with dispatcher instructions regarding CPR, a scoring model was developed. The model assigned rounded integer values of the doubled regression coefficient to variables significantly associated with noncompliance in multivariable logistic regression analysis.[20] The discriminative ability of the model was assessed using the *C*-statistic. Calibration was assessed using the Hosmer–Lemeshow goodness-of-fit test.

Statistical analyses were conducted using R version 4.1.1 (R Foundation for Statistical Computing, Vienna, Austria). Missing values were addressed by excluding incomplete cases on an analysis-by-analysis basis because the proportion of such instances was very low.[21] All statistical tests were two-sided. Results were considered significant if p values were <0.05 or based on 95% CI.

RESULTS

During the study period, 63,288 individuals aged ≥18 years experienced OHCA and were resuscitated and transported by EMS providers in Tokyo (Figure 1). Among these, we identified 23,712 cases in which the emergency caller was a lay rescuer and CPR instructions were provided over the phone by a dispatcher. After excluding 4187 cases in which bystander CPR was provided before the emergency call, 19,525 cases were analyzed. The median patient age was 81 years (interquartile range, 70–87 years), and 56.3% were men. Despite dispatcher instructions regarding CPR, bystander CPR was not provided in 11,443 cases (58.6%). Values for neurological status at 1 month after cardiac arrest were missing in 47 cases (0.2%). There were no missing values for any other variable of interest.

Table 1 shows a comparison of baseline characteristics and outcomes between cases with and without bystander CPR following dispatcher instructions. Noncompliance with dispatcher instructions was more frequent in cases where patients were older, the caller was a family member of the patient, the caller did not witness the cardiac arrest, the event occurred in the bathroom, and the event occurred at night (2300–0659 h). Cases with caller noncompliance with dispatcher instructions had lower 1-month rates of favorable

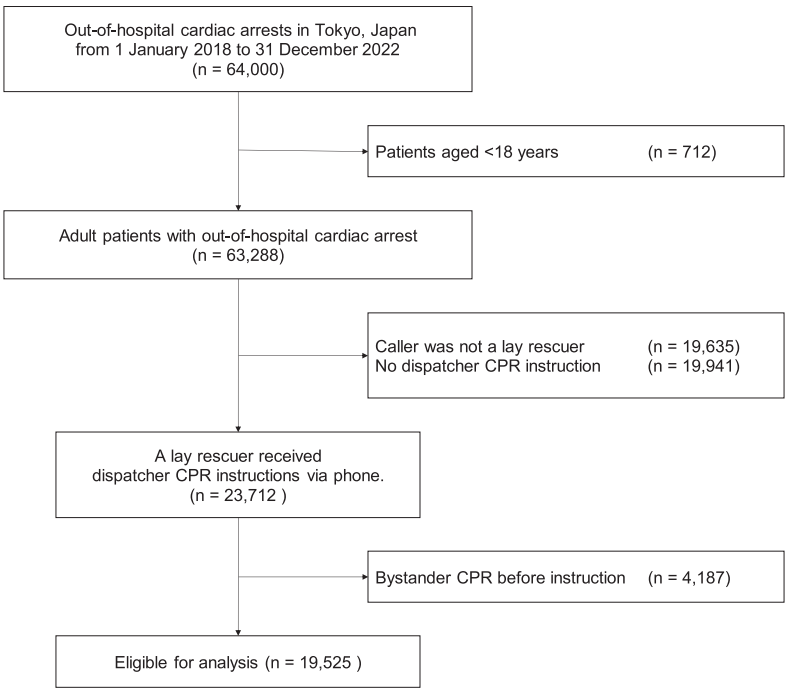

FIGURE 1 Study flowchart. CPR, cardiopulmonary resuscitation.

TABLE 1 Baseline characteristics of patients and outcomes according to caller compliance with dispatcher cardiopulmonary resuscitation instructions.

Characteristics	Overall ($n = 19,525$)	Noncompliant ($n = 11,443$)	Compliant ($n = 8082$)	p-value
Patient age, years	81 (70, 87)	81 (72, 87)	80 (69, 87)	<0.001
Age group, years, *n* (%)				
18–34	263 (1.3)	131 (1.1)	132 (1.6)	<0.001
35–49	841 (4.3)	418 (3.7)	423 (5.2)	
50–64	2109 (10.8)	1131 (9.9)	978 (12.1)	
65–79	5893 (30.2)	3531 (30.9)	2362 (29.2)	
≥80	10,419 (53.4)	6232 (54.5)	4187 (51.8)	
Male patient, *n* (%)	10,986 (56.3)	6620 (57.9)	4366 (54.0)	<0.001
Location of cardiac arrest, *n* (%)				
Living room or bedroom	13,614 (69.7)	7916 (69.2)	5698 (70.5)	<0.001
Bathroom	2699 (13.8)	1848 (16.1)	851 (10.5)	
Other	3212 (16.5)	1679 (14.7)	1533 (19.0)	
Time of emergency call, *n* (%)				
Daytime (0700–1459 h)	7909 (40.5)	4547 (39.7)	3362 (41.6)	<0.001
Evening (1500–2259 h)	7505 (38.4)	4377 (38.3)	3128 (38.7)	
Nighttime (2300–0659 h)	4111 (21.1)	2519 (22.0)	1592 (19.7)	
Caller relationship with the patient, *n* (%)				
Family member	14,621 (74.9)	8998 (78.6)	5623 (69.6)	<0.001
Healthcare provider	2448 (12.5)	1205 (10.5)	1243 (15.4)	
Other	2456 (12.6)	1240 (10.8)	1216 (15.0)	
Cardiac arrest witnessed by the caller	9752 (49.9)	5646 (49.3)	4106 (50.8)	0.045
One-month favorable neurological outcome[a], *n* (%)	310 (1.6)	131 (1.1)	179 (2.2)	<0.001
One-month survival, *n* (%)	598 (3.1)	275 (2.4)	323 (4.0)	<0.001

Note: Continuous variables are presented as medians (interquartile ranges).

[a]Favorable neurological outcome was defined as a Cerebral Performance Category Scale of 1 or 2.

neurological outcome (1.1% vs. 2.2%, $p < 0.001$) and survival (2.4% vs. 4.0%, $p < 0.001$).

Table 2 summarizes the results of the multivariate regression analysis. The following factors were significantly associated with caller noncompliance with dispatcher CPR instructions: patient age (adjusted odds ratio [95% CI], 18–34 years: reference, 35–49 years: 0.96 [0.73–1.27], 50–64 years: 1.13 [0.87–1.47], 65–79 years: 1.39 [1.09–1.79], and ≥80 years: 1.45 [1.13–1.87]), male patient sex (1.21 [1.14–1.29]), nighttime emergency call (0700–1459 h, 1.03 [0.97–1.10], 1500–2259 h: reference, and 2300–0659 h: 1.15 [1.06–1.25]), cardiac arrest in the bathroom (living room or bedroom: 1.06 [0.96–1.16], bathroom: 1.59 [1.41–1.78], and other: reference), and relationship between patient and caller (family: 1.61 [1.47–1.76], healthcare provider: reference, and other: 1.14 [1.00–1.29]).

Risk stratification

To stratify the risk of caller noncompliance with dispatcher CPR instructions, a scoring model was developed (Table 2). The model assigned 1 point each for patient age of ≥65 years, a familial relationship between the caller and the patient, and cardiac arrest in the bathroom. Of 19,525 cases, 1008 (5.2%), 5518 (28.3%), 10,883 (55.7%), and 2116 (10.8%) had risk scores of 0, 1, 2, and 3, respectively. Figure 2 shows the number of patients based on the combination of scoring elements. Higher scores indicated a higher probability of noncompliance. The noncompliance rates were 48.0%, 50.8%, 61.3%, and 70.5% for risk scores of 0, 1, 2, and 3, respectively (Figure 3). The *C*-statistic of the model was 0.57 (95% CI, 0.56–0.58). The Hosmer–Lemeshow goodness-of-fit test demonstrated that the scoring model had a good model fit ($\chi^2 = 1.56$, $p = 0.67$).

DISCUSSION

In this study, we primarily analyzed caller compliance with dispatcher instructions on CPR for OHCA and found that callers did not frequently comply with dispatcher instructions. Five factors (older patient age, male patient sex, emergency call at midnight, cardiac arrest in the bathroom, and a familial relationship between the caller and the patient) were associated with noncompliance. A

TABLE 2 Results of multivariate logistic regression analysis and scoring points.

Variable	Adjusted odds ratio (95% CI)	Coefficient	Point
Patient age group, years			
18–34	Reference	Reference	
35–49	0.96 (0.73–1.27)	−0.04	
50–64	1.13 (0.87–1.47)	0.12	
65–79	1.39 (1.09–1.79)	0.33	1
≥80	1.45 (1.13–1.87)	0.37	1
Male sex	1.21 (1.14–1.29)	0.19	0
Location of cardiac arrest			
Living room or bedroom	1.06 (0.96–1.16)	0.05	
Bathroom	1.59 (1.41–1.78)	0.46	1
Other	Reference	Reference	
Time of the emergency call			
Daytime (0700–1459 h)	1.03 (0.97–1.10)	0.03	
Evening (1500–2259 h)	Reference	Reference	
Nighttime (2300–0659 h)	1.15 (1.06–1.25)	0.14	0
Caller relationship with the patient			
Family member	1.61 (1.47–1.76)	0.48	1
Healthcare provider	Reference	Reference	
Other	1.14 (1.00–1.29)	0.13	
Cardiac arrest witnessed by the caller	0.96 (0.90–1.02)	−0.04	

Abbreviation: CI, confidence interval.

simple scoring model assigned 1 point each for a patient aged ≥65 years, familial relationship between the caller and the patient, and cardiac arrest in the bathroom and effectively stratified the probability of caller noncompliance with dispatcher instruction. The strength of this study is the use of a population-based database, which allowed us to estimate the incidence of noncompliance and identify risk factors in a less biased manner. To the best of our knowledge, this is the largest study to investigate factors associated with caller compliance with dispatcher instructions regarding CPR and represents the first attempt to stratify noncompliance risk.

We found that 41.4% of lay rescuers provided CPR after receiving dispatcher CPR instructions. This finding is consistent with the previously reported range of 15%–84%.[11,12,18,22] The rate in this study was lower than the 75% recommended as a performance goal in the guidelines.[10] This could be partially attributed to the fact that our analysis included cases that the guidelines excluded, such as a case where "Caller is unable to physically perform CPR" or "Caller is unable to get the patient into the appropriate position for CPR."[10] Nevertheless, our findings suggest that the current success rate of dispatcher CPR instructions to lay rescuers is suboptimal, underscoring the need for additional initiatives to improve it.

A familial relationship between the patient and the caller was the most significant risk factor for noncompliance with dispatcher CPR instructions, as indicated by the highest odds ratio. A previous study reported that bystander CPR was less likely to be continued if the caller was a family member.[18] Several factors may explain these results. First, emotional distress, a leading barrier to following dispatcher instructions,[11] is often heightened for family members. This distress may impair the ability of the caller to follow

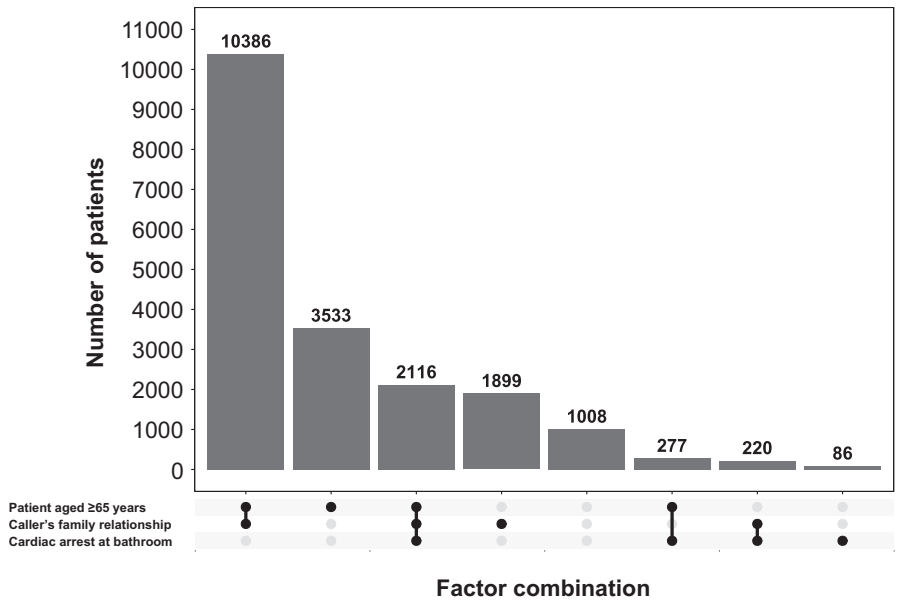

FIGURE 2 Histogram showing the number of patients based on a combination of scoring elements.

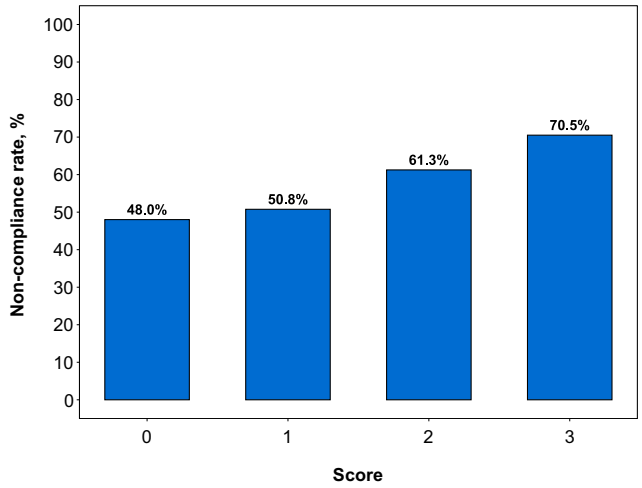

FIGURE 3 Proportion of callers who did not follow dispatcher instructions regarding cardiopulmonary resuscitation.

CPR instructions. Second, family members typically lack CPR knowledge compared to other potential callers such as healthcare providers, police staff, or civil servants. Last, family members may refuse to perform CPR out of respect for the patient's wishes, particularly in the case of older individuals.[23]

Cardiac arrest in the bathroom also significantly influenced caller noncompliance. Although dispatchers instruct callers to lay patients flat for CPR,[10] this is physically challenging when a patient collapses in a bathtub. This inability to achieve the optimal position for CPR is another major reason for noncompliance with dispatcher CPR instructions and may explain our results.[10,23–25] A nighttime call was another risk factor for noncompliance. Potential reasons for higher noncompliance during nighttime calls include increased fatigue, stress, reduced cognitive alertness, or heightened emotional distress, which could impair the ability to follow instructions.

We found that dispatchers can stratify the risk of caller noncompliance with instructions based solely on three fundamental pieces of information obtained during the initial stage of an emergency call. While cases with scores of 0 and 1 had a similar risk of noncompliance, for cases with scores of 2 and 3, there was a risk increase of approximately 10% for each point, from approximately 50%–70%. Our results have significant clinical implications, as EMS telecommunicators can integrate the scoring model into their initial caller assessment to predict potential noncompliance and adjust their communication approach accordingly. For callers with higher scores, dispatchers can proactively modify their communication strategies by reinforcing CPR instructions through specific, step-by-step, and repetitive communication. Additionally, dispatchers may consider involving additional personnel or prearrival paramedic calls to support lay rescuers. By using this scoring model, dispatchers can tailor their communication and increase follow-up support, ultimately improving compliance with CPR instructions. Furthermore, knowledge regarding high-risk scenarios not only benefits dispatchers in their operations but also contributes to the improvement of telecommunicator-assisted CPR programs.

Limitations

This study has several limitations. First, this was an observational study; therefore, we cannot determine the mechanisms through which risk factors are related to caller noncompliance, although we discuss this issue based on previous studies and clinical experiences. Second, although we succeeded in risk stratification, the discrimination ability of the model was modest. This may partly be attributable to the complex factors influencing caller noncompliance. Some baseline characteristics that may be associated with caller noncompliance, such as caller age, physical disability,[23] and knowledge about CPR[18] were not assessed because this information was not available. Incorporating these variables may enhance the effectiveness of the model. Third, while we included only patients who were resuscitated and transported to hospitals, some may have been transferred for end-of-life care rather than aggressive resuscitation. In this context, caller noncompliance with CPR instructions is not an issue; however, we could not consider such occurrences, as the relevant information was not recorded in the data set. Last, our results need to be externally validated because caller compliance may be influenced by factors such as patient demographics, the EMS system, and the strength of public response to OHCA.

CONCLUSION

Even when dispatchers recognized OHCAs and provided CPR instructions via phone, lay rescuers did not follow their instructions in approximately half of the cases analyzed. This noncompliance was associated with c, emergency calls at midnight, cardiac arrest in the bathroom, and a familial relationship between the caller and the patient. A simple scoring model assigned 1 additional point for each of the following: patient age of ≥65 years, a familial relationship between the caller and the patient, and cardiac arrest in the bathroom, and effectively stratified the probability of caller noncompliance with dispatcher CPR instructions.

ACKNOWLEDGEMENTS
The authors have nothing to report.

FUNDING INFORMATION
None declared.

CONFLICT OF INTEREST STATEMENT
The authors declare no conflicts of interest.

DATA AVAILABILITY STATEMENT
The data that support the findings of this study are available from Tokyo Fire Department. Restrictions apply to the availability of these data, which were used under license for

this study. Data are available from the author(s) with the permission of Tokyo Fire Department.

ETHICS STATEMENT

Approval of the research protocol: The Institutional Ethics Committee of Metropolitan Bokutoh Hospital approved the study (approval number 05-095).
Informed consent: Waived the requirement for informed consent because the data were anonymized before analysis.
Registry and the registration no. of the study/trial: NA.
Animal studies: NA.

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REFERENCES

1. Kiguchi T, Okubo M, Nishiyama C, Maconochie I, Ong MEH, Kern KB, et al. Out-of-hospital cardiac arrest across the world: first report from the international liaison committee on resuscitation (ILCOR). Resuscitation. 2020;152:39–49.
2. Benjamin EJ, Blaha MJ, Chiuve SE, Cushman M, das S, Deo R, et al. Heart disease and stroke Statistics-2017 update: a report from the American Heart Association. Circulation. 2017;135:e146–e603.
3. Berdowski J, Berg RA, Tijssen JGP, Koster RW. Global incidences of out-of-hospital cardiac arrest and survival rates: systematic review of 67 prospective studies. Resuscitation. 2010;81:1479–87.
4. Yoon H, Ahn KO, Park JH, Lee SY. Effects of pre-hospital re-arrest on outcomes based on transfer to a heart attack centre in patients with out-of-hospital cardiac arrest. Resuscitation. 2022;170:107–14.
5. Yan S, Gan Y, Jiang N, Wang R, Chen Y, Luo Z, et al. The global survival rate among adult out-of-hospital cardiac arrest patients who received cardiopulmonary resuscitation: a systematic review and meta-analysis. Crit Care. 2020;24:61.
6. Hasselqvist-Ax I, Riva G, Herlitz J, Rosenqvist M, Hollenberg J, Nordberg P, et al. Early cardiopulmonary resuscitation in out-of-hospital cardiac arrest. N Engl J Med. 2015;372:2307–15.
7. Wyckoff MH, Greif R, Morley PT, Ng KC, Olasveengen TM, Singletary EM, et al. 2022 international consensus on cardiopulmonary resuscitation and emergency cardiovascular care science with treatment recommendations: summary from the basic life support; advanced life support; paediatric life support; neonatal life support; education, implementation, and teams; and first aid task forces. Resuscitation. 2022;181:208–88.
8. Vaillancourt C, Stiell IG, Wells GA. Understanding and improving low bystander CPR rates: a systematic review of the literature. CJEM. 2008;10:51–65.
9. Wang J, Zhang H, Zhao Z, Wen K, Xu Y, Wang D, et al. Impact of dispatcher-assisted bystander cardiopulmonary resuscitation with out-of-hospital cardiac arrest: a systemic review and meta-analysis. Prehosp Disaster Med. 2020;35:372–81.
10. Kurz MC, Bobrow BJ, Buckingham J, Cabanas JG, Eisenberg M, Fromm P, et al. Telecommunicator cardiopulmonary resuscitation: a policy statement from the American Heart Association. Circulation. 2020;141:e686–e700.
11. Lerner EB, Sayre MR, Brice JH, White LJ, Santin AJ, Billittier AJ IV, et al. Cardiac arrest patients rarely receive chest compressions before ambulance arrival despite the availability of pre-arrival CPR instructions. Resuscitation. 2008;77:51–6.
12. Fukushima H, Panczyk M, Spaite DW, Chikani V, Dameff C, Hu C, et al. Barriers to telephone cardiopulmonary resuscitation in public and residential locations. Resuscitation. 2016;109:116–20.
13. Ho AFW, Sim ZJ, Shahidah N, Hao Y, Ng YY, Leong BSH, et al. Barriers to dispatcher-assisted cardiopulmonary resuscitation in Singapore. Resuscitation. 2016;105:149–55.
14. von Elm E, Altman DG, Egger M, Pocock SJ, Gøtzsche PC, Vandenbroucke JP, et al. Strengthening the reporting of observational studies in epidemiology (STROBE) statement: guidelines for reporting observational studies. Lancet. 2007;370:1453–7.
15. Jacobs I, Nadkarni V, Bahr J, Berg RA, Billi JE, Bossaert L, et al. Cardiac arrest and cardiopulmonary resuscitation outcome reports: update and simplification of the Utstein templates for resuscitation registries: a statement for healthcare professionals from a task force of the international liaison committee on resuscitation (American Heart Association, European resuscitation council, Australian resuscitation council, New Zealand resuscitation council, Heart and Stroke Foundation of Canada, InterAmerican Heart Foundation, resuscitation councils of southern Africa). Circulation. 2004;110:3385–97.
16. McNally B, Robb R, Mehta M, Vellano K, Valderrama AL, Yoon PW, et al. Out-of-hospital cardiac arrest surveillance—cardiac arrest registry to enhance survival (CARES), United States, October 1, 2005–December 31, 2010. MMWR Surveill Summ. 2011;60:1–19.
17. Matsumura Y, Nakada TA, Shinozaki K, Tagami T, Nomura T, Tahara Y, et al. Nighttime is associated with decreased survival and resuscitation efforts for out-of-hospital cardiac arrests: a prospective observational study. Crit Care. 2016;20(1):141. https://doi.org/10.1186/s13054-016-1323-4
18. Martinage A, Penverne Y, Le Conte P, San Miguel M, Jenvrin J, Montassier E, et al. Predictive factors of successful telephone-assisted cardiopulmonary resuscitation. J Emerg Med. 2013;44:406–12.
19. Dainty KN, Colquitt B, Bhanji F, Hunt EA, Jefkins T, Leary M, et al. Understanding the importance of the lay responder experience in out-of-hospital cardiac arrest: a scientific statement from the American Heart Association. Circulation. 2022;145:e852–e867.
20. Sullivan LM, Massaro JM, D'Agostino RB Sr. Presentation of multivariate data for clinical use: the Framingham study risk score functions. Stat Med. 2004;23:1631–60.
21. Lee KJ, Tilling KM, Cornish RP, Little RJA, Bell ML, Goetghebeur E, et al. Framework for the treatment and reporting of missing data in observational studies: the treatment and reporting of missing data in observational studies framework. J Clin Epidemiol. 2021;134:79–88.
22. Hardeland C, Skåre C, Kramer-Johansen J, Birkenes TS, Myklebust H, Hansen AE, et al. Targeted simulation and education to improve cardiac arrest recognition and telephone assisted CPR in an emergency medical communication centre. Resuscitation. 2017;114:21–6.
23. Case R, Cartledge S, Siedenburg J, Smith K, Straney L, Barger B, et al. Identifying barriers to the provision of bystander cardiopulmonary resuscitation (CPR) in high-risk regions: a qualitative review of emergency calls. Resuscitation. 2018;129:43–7.
24. Hauff SR, Rea TD, Culley LL, Kerry F, Becker L, Eisenberg MS. Factors impeding dispatcher-assisted telephone cardiopulmonary resuscitation. Ann Emerg Med. 2003;42:731–7.
25. Lewis M, Stubbs BA, Eisenberg MS. Dispatcher-assisted cardiopulmonary resuscitation: time to identify cardiac arrest and deliver chest compression instructions. Circulation. 2013;128:1522–30.

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