Effectiveness of dispatcher instructions-dependent or independent bystander cardiopulmonary resuscitation on neurological survival among patients with out-of-hospital cardiac arrest

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Introduction: We evaluated the association between survival and bystander cardiopulmonary resuscitation (CPR) with or without dispatcher instructions (DI) considering the time from emergency call receipt by the dispatch center to emergency medical services (EMS) personnel’s contact with the patient (i.e., time to EMS arrival).

Methods: This prospective study, conducted in Osaka City, Japan from 2009 to 2015, included patients with medical cause-related out-of-hospital cardiac arrest who were ≥18 years old. The primary outcome was one-month favorable neurological outcomes. Favorable neurological outcomes were defined as a cerebral performance category score of 1 or 2. Using multiple logistic regression models, the adjusted odds ratios of independent and DI-dependent CPR for the primary outcome were compared with no CPR. The effective estimated “time to EMS arrival” was also calculated.

Results: For analyses 10,925 individuals were eligible. Independent CPR had a significantly higher one-month favorable neurological survival than no CPR whereas there was no significant difference between DI-dependent CPR and no CPR (adjusted odds ratios, 1.90 [1.47–2.46] and 1.16 [0.91–1.47], respectively). The estimated “time to EMS arrival” for a one-month favorable neurological survival after independent CPR was ≤13 minutes.

Conclusions: Bystander CPR that did not need DI was associated with significantly higher one-month favorable neurological survival than no CPR, with an effective estimated “time to EMS arrival” of ≤13 minutes.

Table1. Characteristics of out-of-hospital cardiac arrests who were received no CPR, DI-dependent CPR, and independent CPR			
	No CPR (n= 6,754)	DI-dependent CPR (n= 3,103)	Independent CPR (n= 1,068)
Age, year, mean (SD)	72.3 (14.3)	73.8 (14.5)	69.0 (15.3)
Men, n (%)	4,281 (63.4)	1,789 (57.7)	732 (68.5)
Location, n (%)			
home	5,306 (78.6)	2,690 (86.7)	519 (48.6)
Public space	1,122 (16.6)	329 (10.6)	442 (41.4)
Others	326 (4.8)	84 (2.7)	107 (10.0)
Activities of daily living before the cardiac arrest, n (%)			
Good (no disability)	4,552 (67.4)	2,065 (66.5)	742 (69.5)
Moderate disability	1,029 (15.2)	561 (18.1)	135 (12.6)
Severe disability	573 (8.5)	366 (11.8)	97 (9.1)
Vegetative state	5 (0.1)	3 (0.1)	0 (0.0)
Unknown	595 (8.8)	108 (3.5)	94 (8.8)
Witnessed by bystanders, n (%)	2,706 (40.1)	1,031 (33.2)	571 (53.5)
Chest compression only CPR, n (%)	0 (0.0)	2,477 (79.8)	812 (76.0)
Etiology of cardiac arrest, n (%)	6,135 (90.8)	2,873 (92.6)	973 (91.1)
The time from EMS contact with the patient to patient's arrival at the hospital, minutes, mean (SD)	22.4 (9.0)	22.3 (8.1)	21.2 (7.8)
Automatic external defibrillator shock by bystanders, n (%)	3 (0.04)	28 (0.9)	98 (9.2)
Shockable first cardiac rhythm recorded by EMS personnel, n (%)	689 (10.2)	298 (9.6)	205 (19.2)

SD denotes standard deviation.

Figure A.

Figure B.

Table2. One-month survival with favorable neurological outcomes among no CPR, DI-dependent CPR, and independent CPR			
	No CPR (n=6,754)	DI-dependent CPR (n=3,103)	Independent CPR (n=1,068)
One-month survival with favorable neurological outcomes, n (%)	251 (3.72)	115 (3.71)	111 (10.42)
Unadjusted odds ratio (95% confidence interval)	Reference	1.00 (0.80-1.25)	3.01 (2.39-3.81)
Adjusted odds ratio (95% confidence interval)	Reference	1.16 (0.91-1.47)	1.90 (1.47-2.46)

Adjusted odds ratios are adjusted to patients’ age, sex, activities of daily living before the cardiac arrest, year of cardaic arrest, location, presence or absence of witnesses, etiology of cardiac arrest, and the time from emergency medical services' contact with the patient to patient's arrival at the hospital.

The research protocol was approved by the Ethics Committee of Kyoto University Graduate School of Medicine (R0416).

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