TELEPHONE CPR COULD IMPROVE PATIENTS' OUTCOME FROM ANALYSIS OF 3 YEARS KUMAMOTO CITY PREHOSPITAL RECORDS OF OUT-OF-HOSPITAL CARDIAC ARREST.

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Introduction:
Telephone CPR by dicpatcher-assist (DA) is one of the strategies for improve outcome in out-of-hospital cardiac arrest (OHCA) patients. Kumamoto city (Japan) has a population of 730,000, an area of 390 km^2, and 25 ambulances. The DA protocol was started in 2014. The protocol of Kumamoto city fire services bureau is that (1) DA starts once the emergency center receives a call regarding an unconscious or abnormally breathing person, (2) in some cases, the dispatcher confirmed abnormal breathing by asking the bystander to place the cell phone close to the patient's mouth, (3) the dispatcher provides advice on performing chest compression, (4) if an AED is available, the dispatcher provides advice on how to use it, (5) the dispatcher does not terminate the call until an ambulance reaches the scene.

Hypothesis:
Telephone CPR by DA could improve neurological outcome of OHCA patients.

Methods:
Kumamoto city prehospitalisation records of OHCA patients were retrospectively analyzed. The patients were divided into DA received and non-DA received groups. The neurological outcomes and clinical factors were compared between the two groups using univariate and multivariate statistical method, as well as propensity score analysis with inverse probability of treatment weighting method.

Statistical analyses were performed by SPSS software 23.0 except for propensity score analysis. Propensity score analysis was performed by R software version 3.1.2. Univariate analyses were performed with the Mann-Whitney U test for continuous variables and Fisher's exact test for categorical variables. Multivariate analyses were performed with logistic regression analysis.

Table1: Characteristics of out-of-hospital cardiac arrest cases in Kumamoto city 2014–2016

Variables	All cases n = 1607	DA(+) n = 1132 (71%)	DA(-) n = 474 (29%)	Univariate P value	Multivariate P value	Odds ratio (95%CI)
Age (y.o.)	79 (65–87)	80 (66–87)	78 (62–86)	0.004	0.090	1.005 (0.999–1.011)
Male	874 (54%)	600 (53%)	274 (58%)	0.079	0.336	0.891 (0.704–1.127)
Witness	604 (38%)	352 (31%)	252 (53%)	<0.001	<0.001	0.459 (0.362–0.581)
Cardiogenic	982 (61%)	709 (63%)	273 (58%)	0.064	0.152	1.194 (0.937–1.522)
Ambulance team activity						
ROSC at ambulance admission	131 (8%)	47 (4%)	84 (18%)	<0.001	<0.001	0.217 (0.141–0.332)
Initial rhythm as VF/VT	90 (6%)	53 (5%)	37 (8%)	0.017	0.525	0.763 (0.332–1.754)
Defibrillation	129 (8%)	75 (7%)	54 (11%)	0.002	0.231	0.652 (0.323–1.313)
Tracheal intubation	103 (6%)	78 (7%)	25 (5%)	0.264	0.657	1.120 (0.681–1.841)
Supraglottic device	250 (16%)	178 (16%)	72 (15%)	0.821	0.628	0.924 (0.670–1.274)
Adrenaline infusion	303 (19%)	234 (21%)	69 (15%)	0.005	0.008	1.546 (1.122–2.130)
CPC1–2 at hospital discharge	71 (4%)	43 (4%)	28 (6%)	0.063	0.008	2.273 (1.242–4.160)

Table 2: Rates of bystander CPR or public access defibrillation

Variables	DA(+) n = 1132	DA(-) n = 474	P value
Bystander CPR	817/1132 (72%)	79/472 (17%)	<0.001
Public access defibrillation	121/1132 (11%)	25/474 (5%)	<0.001

Table 3: Propensity score analysis with inverse probability of treatment weighting method for CPC 1–2 outcome at hospital discharge

Variable	Odds ratio (95%CI)	P value
DA(+) (v.s. DA(-))	1.718 (1.017–2.902)	0.0431

Adjusted by age, male, witness, cardiogenic, ROSC at ambulance admission, initial rhythm as VF/VT, and ambulance activities (defibrillation, tracheal intubation, supraglottic device, and adrenal infusion)

Discussion:
In the present study, the difference between DA and non-DA groups, might be recognized and unrecognized. Therefore, dispatcher could recognize 71% of OHCA patients in Kumamoto city. [Current report showed OHCA recognition rate by dispatcher were 70-78% (J Trauma Resusc Emerg Med 2017; 25: 9, Resuscitation 2016; 109: 1-8, Resuscitation 2017; 115: 141-7)].

Although, patients in non-DA group were treated as unrecognized OHCA, 17% of patients received bystander CPR and 5% received public access defibrillation. Thus, 17% of patients might be treated by a knowledgeable bystander. However, despite these knowledgeable bystander effort, propensity score analysis showed DA advantage for neurological outcome. DA group showed 71% of bystander CPR and 11% of public access defibrillation, which were 2-3 times higher rate than non-DA group, despite almost all knowledgeable bystanders were included in non-DA group.

These high rate of recognition OHCA, and significant increase bystander CPR and public access defibrillation rates, suggested the protocol of Kumamoto city fire services bureau is effective. Propensity score analysis suggested DA advantage having 1.718 odds ratio, which meant 1.3/100 persons might have advantage.

This study has some limitation. First, this was a retrospective study at single city and involved small number of patients, which may limited strength of conclusion. Second, many patients had ROSC at ambulance admission, but their OHCA status was documented by member of the public. Third, the neurological outcomes were assessed at hospital discharge, but some patients might experience neurological improvements after discharge.

Conclusions:
Telephone CPR by dispatcher-assist could improve neurological outcome in out-of-hospital cardiac arrest patients.