Evaluation of the stepwise promotion of DA-CPR on nationwide Japan.

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Background

Dispatcher-assisted cardiopulmonary resuscitation (DA-CPR) by Japanese fire departments started since 2005. Moreover, hands-only CPR had been taught since 2011. DA-CPR has been involved in cardiac arrest and affects the favorable neurological.

Purpose

To examine the trend of effects on neurological outcome with DA-CPR. We analyzed Utstein data of witnessed cardiogenic cardiac arrest cases of the nationwide Japan by era.

Methods

A total of 68,773 witnessed cardiogenic cardiac arrest with ages from 15 to 94 years who received Bystander CPR with DA-CPR were extracted.

Figure1 Flowchart of this study.
OHCA, Out-of-hospital cardio arrest; CPC, cerebral performance category; CPR, cardiopulmonary resuscitation

The subjects were stratified into three groups from 2005 to 2007, 2008 to 2011, and 2012 to 2015. The number of cases with 1-month favorable neurological outcome (CPC1-2 %) were compared as primary outcome. Secondary outcome were ROSC and shockable rhythm of initial ECG (VF,VT). Standardized mean difference (hereinafter, SMD) was used for comparison between groups. In addition, logistic regression analysis and odds ratio were used.

Results

Hands-only CPR was occupied about 60% in general. Number of Hands-only CPR and CC & PAD increased by year. On the other hand Rescue breathing and Chest Compression (Conventional CPR) decreased.

Table1 Characteristics of the Study Participants by Dispatch assisted of Bystander CPR

n(%)	2005-2007 (12,388)	SMD ^a	2008-2011 (24,611)	SMD ^a	2012-2015 (31,774)	SMD ^a
Age						
15-64	3,247(26.2)	Reference	5,834(23.7)	-5.8	6,746(21.2)	-11.7
65-74	2,615(21.1)	Reference	4,595(18.7)	-6.1	5,909(18.6)	-6.3
75-84	3,774(30.5)	Reference	7,657(31.1)	1.4	9,503(29.9)	-1.2
85-94	2,752(22.2)	Reference	6,525(26.5)	10.0	9,616(30.3)	18.4
Gender,male	7,845(63.3)	Reference	15,317(62.2)	-2.3	19,526(61.5)	-3.9
Bystander intervention						
Hands-only	7,024(56.7)	Reference	18,572(75.5)	40.4	26,539(83.5)	61.3
CC & PAD	92(0.7)	Reference	770(3.1)	17.4	1,579(5)	25.6
PAD Alone	6(0)	Reference	24(0.1)	1.8	39(0.1)	2.5
Conventional CPR ^b	5,266(42.5)	Reference	5,245(21.3)	-46.7	3,617(11.4)	-74.9
EMT treatment						
Defibrillation	3,751(30.3)	Reference	7,285(29.6)	-1.5	8,641(27.2)	-6.8
Advanced airway manegement	6,944(56.1)	Reference	12,164(49.4)	-13.3	14,590(45.9)	-20.4
Adrenaline	630(5.1)	Reference	4,818(19.6)	45.2	8,717(27.4)	63.5
Call 119 to EMS arrival average	0:08	Reference	0:08	0.0	0:09	0.2
Call 119 to Hospital arrival average	0:32	Reference	0:32	0.0	0:33	0.4
VF/VT	3,151(25.4)	Reference	6,234(25.3)	-0.2	7,329(23.1)	-5.5
ROSC	1,411(11.4)	Reference	3,902(15.9)	13.0	6,168(19.4)	22.4
CPC1,2	673(5.4)	Reference	2,010(8.2)	10.9	3,165(10)	17.1

OHCA,out-of-hospital SMD, standardized mean deference ;DA, dispatch assisted ;BCPR, bystander cardiopulmonary resuscitation; BCC,bystander chest compression; PAD,public access defibrillation; EMT,emergency medical technician;VF,ventricular fibrillation, VT,ventricular tachycardia;SD,standard deviation ROSC,return of spontaneous circulation;CPC, cerebral performance category;
a) SMD(standardized mean deference) were calculated based on 2005-2007.
b)Conventional CPR means rescue breathing and chest compression CPR.

CPC1-2 in 2005-2007 is 673 (5.4%), 2008-2011 is 2,010 (8.2%), and in 2012-2015 is 3,165 (10%). About 4.7 times increased compared with the 2005-2007 years group(2012-2015: OR, 2.59; 95% CI, 2.36-2.58).ROSC in 2005-2007 is 1,411 (11.4%), 2010-2011 is 3,902 (15.9%), and in 2012-2015 is 6,168 (19.4%) .

2012-2015 compared with the 2005-7 years group (2012-2015: OR, 1.85; 95% CI, 1.73-1.98).

Table2 ORs of the yearly effect of DA-CPR in OHCA

	n	%	Unadjusted OR	adjusted OR
VF/VT				
2005-2007	3 151	25.4	Reference	Reference
2008-2011	6 234	25.3	0.99(95%CI 0.95-1.04)	1.20(95%CI 1.08-1.32)
2012-2015	7 329	23.1	0.88(95%CI 0.84-0.92)	1.15(95%CI 1.04-1.27)
ROSC				
2005-2007	1 383	11.2	Reference	Reference
2008-2011	3 893	15.8	1.50(95%CI 1.40-1.60)	1.30(95%CI 1.22-1.40)
2012-2015	6 168	19.4	1.92(95%CI 1.80-2.04)	1.85(95%CI 1.73-1.98)
CPC1-2				
2005-2007	673	5.4	Reference	Reference
2008-2011	2 010	8.2	1.55(95%CI 1.41-1.69)	1.74(95%CI 1.57-1.92)
2012-2015	3 165	10.0	1.93(95%CI 1.77-2.10)	2.59(95%CI 2.36-2.85)

VF,ventricular fibrillation, VT,ventricular tachycardia;SD,standard deviation ROSC,return of spontaneous circulation;CPC, cerebral performance category;
Reference is 2005-2007 group.
*Adjusted for prefectures, age, sex, bystander intervention, EMT treatment, call 119 to EMS arrival average, call 119 to hospital arrival average.

Discussion

The Ministry of Fire and Disaster management has promoted DA-CPR to fire departments nationwide. DA-CPR has been simplified since 2010, and hands-only CPR has been implemented. As a result, DA-CPR increased, and favorable neurological outcomes and ROSC increased stepwise.

Conclusion

DA-CPR becomes clear that the CPC1-2 and ROSC are also improved. Hands-only CPR and CC & PAD increased year by year from 2005.