

Takimoto, Taro; Sakata, Kazuya; Nakajima, Kazunori; Narukawa, Masaki; Sakamoto, Naoki

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Disparity in emergency medical services across Japan¹

Taro Takimoto², Kazuya Sakata³, Kazunori Nakajima⁴, Masaki Narukawa⁵, Naoki Sakamoto⁶

Abstract

By using a prospective, nation-wide, population-based out-of-hospital cardiac arrest (OHCA) database (All-Japan Utstein Registry, January 1, 2005 to December 31, 2012), we examined the disparity in emergency medical services across Japan and found significant disparities among prefectures. By dividing Japan into seven parts, Hasegawa et al. (2013) analysed regional variability in survival outcomes of OHCA and found a two-fold regional difference in neurologically favourable survival after OHCA. However, seven regions are constructed of North, Northeast, East, Central, Midwest, West, South, and Japan has 47 prefectures. Each prefecture grouped in the same region would be different from others in many aspects. To identify regional disparities more in prehospital care and in-hospital post-resuscitation care, we investigated survival outcomes of OHCA in prefecture levels. As the budgets of central and local governments are not unrestrained but restricted all over the world, the findings in the paper would be beneficial to consider optimal level of regional emergency medical services.

Keywords: Emergency Medical Service, Out-of-Hospital Cardiac Arrest, Disparity among Prefectures, One-Month Survival Rate, Health Economics

JEL Classifications: I14, C25, C55

1. Introduction

A mortality rate of cardiac arrest is quite high and it is a major public health problem in the world. To improve the rate of survival after out-of-hospital cardiac arrest (OHCA), regional characteristics would be beneficial. Japan is 378,000 km² in area, and long and narrow country richly endowed with nature. The paper investigates whether an idiosyncratic effect of each prefecture affects the rates of one month survival and neurological favourable outcome.

By dividing Japan into seven parts, Hasegawa et al. (2013) analysed regional variability in survival

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² Faculty of Economics, Kyushu University

³ Graduate School of Engineering, Utsunomiya University

⁴ School of Human Science and Environment, University of Hyogo

⁵ Faculty of Economics, Okayama University

⁶ Faculty of Literature and Social Sciences, Yamagata University

outcomes of OHCA and found a two-fold regional difference in neurologically favourable survival after OHCA. However, seven regions are constructed of North, Northeast, East, Central, Midwest, West, South, and Japan has 47 prefectures. Each prefecture grouped in the same region would be different from others in many aspects; road conditions, the number and quality of emergency life guards, the number and locations of hospitals, characteristics of local residents, and so on. To identify regional disparities more in prehospital care and in-hospital post-resuscitation care, we investigated survival outcomes of OHCA in prefecture levels. As the budgets of central and local governments are not unrestrained but restricted all over the world, the findings in the paper would be beneficial to consider optimal level of regional emergency medical services.

This paper is organized as follows. Section 2 describes statistical methods and the dataset, and in Section 3 the disparity of one month survival and favourable neurological outcome across Japan are investigated. Conclusions are given in Section 4.

2. Methods and data

2.1. Study design and data source

By using a prospective, nation-wide, population-based OHCA database (All-Japan Utstein Registry of the Fire and Disaster Management Agency (FDMA), January 1, 2005 to December 31, 2012), we examined the disparity in emergency medical services (EMS) across Japan and found significant disparities among prefectures. We investigated this data set with the permission of the FDMA. Although the number of observations in this period is 871,721, 159,921 samples were excluded because of remained errors in the data set. For example, an undefined option is chosen, any of options is not selected, there is a contradiction between queries or between time intervals, and so on. Furthermore, cardiac arrests with external causes were excluded as in Hasegawa et al. (2013).

All-Japan Utstein Registry of the FDMA were analysed by Kitamura et al. (2010) and Akahane et al. (2011), for example. Kitamura et al. (2010) studied the use of automated external defibrillator (AED) in public places and Akahane et al. (2011) examined the effects of sex on OHCA outcomes.

2.2 EMS system in Japan

FDMA explains on the web page that emergency medical technicians are nationally certified members of emergency response teams able to provide medical treatment and other life-saving techniques to patients who are suffering cardiac arrest. Training of emergency medical technicians has progressed steadily since the introduction of the system in 1991, and these personnel are active throughout the various emergency situations. The FDMA has continued to train emergency medical technicians with the aim of providing each and every emergency response team throughout the country with at least one emergency medical technician.

All EMS providers performed cardiopulmonary resuscitation (CPR) according to Japanese CPR guidelines. As EMS providers are not allowed to terminate resuscitation out-of-hospital in Japan, EMS personnel transport patients with an OHCA to hospitals and record them in the database.

2.3. Data collection

Data were collected prospectively based on the Utstein-style guidelines for reporting out-of-hospital cardiac arrests; sex, age, the initial cardiac rhythm, the time course of resuscitation, bystander's witness status, first documented cardiac rhythm, presence and type of cardiopulmonary resuscitation by bystander, use of a public-access automated external defibrillators, an emergency lifesaving technician in ambulance, administration of adrenaline by EMS personnel, technique of airway management, return of spontaneous circulation prior to hospital arrival, and survival and neurologic status one-month after the event.

2.4. Study endpoints

The primary end point was survival at one month, and the secondary endpoint was favourable neurological outcome one month after cardiac arrest with minimal neurologic impairment, which was defined as Glasgow-Pittsburg cerebral performance (5 categories) category 1 (good performance) or category 2 (moderate disability).

2.5. Statistical analysis

To identify regional disparities more in prehospital care and in-hospital post-resuscitation care, we investigated survival and neurological outcomes one month after OHCA in prefecture levels. First, by setting one month survival after cardiac arrest or favourable neurological outcome as the dependent variable, a logistic regression is conducted to estimate the coefficient of each prefecture dummy variable. Tokyo is set as a reference prefecture. Estimates of dummy variables indicate the extent to which one month survival or favourable neurological outcome is superior or inferior to in Tokyo. Second, by controlling effects of sex, age, cardiogenic, ventricular fibrillation (VF), pulseless ventricular tachycardia (VT), pulseless electrical activity (PEA), asystole, CPR by bystanders, AED by bystanders, medicine, the use of instrument, the presence of emergency medical technician in ambulance, the idiosyncratic effect of each prefecture is re-estimated. To check the robustness of results, we divide the data set into two parts; arrests with noncardiogenic and with cardiogenic. We estimate coefficients of prefecture dummies by using these two data sets. Furthermore, we focus on witnessed arrests with cardiogenic and VFVT, since these samples are seemed to have a high probability of one month survival.

All statistical analyses were performed with the use of NLOGIT statistical software with the version 5. All tests were two-tailed, and $P<0.05$ was regarded as statistically significant.

3. Results

3.1. Basic statistics of out-of-hospital cardiac arrests

Figure 1 shows a participant selection in the present study. During the periods of January 1, 2005 to December 31, 2012, 871,721 OHCA occurred in Japan. All of them have been recorded based on the Utstein style. As there remain some errors in the data set which is provided by FDMA, 159,921 patients are excluded in the study. For example, an undefined option is chosen. Although one of options should be selected, any of them is not chosen. There is a contradiction between queries or between time intervals which are recorded by EMS system. Furthermore, arrests with external causes are excluded as Hasegawa et al. (2013). Finally, 711,800 arrests are eligible for the analysis in the paper.

Checking the robustness of results, following four sets of data set are used;

1. all samples (711,800),
2. noncardiogenic arrests (228,477),
3. cardiogenic arrests (483,323),
4. witnessed cardiogenic arrests with VF/pulseless VT (36,909).

Table 1 reports basic statistics for 4 sets of data set. About 30% of witnessed cardiogenic arrests with VFVT survive after OHCA, and it is quite higher than ones of other data sets. The cases that AED was performed by bystanders are very rare, and at most it was 2.44%. Median age of witnessed cardiogenic arrests with VFVT is 10 years younger than median ages in other 3 sets of data.

3.2. Variation of OHCA outcomes across Japan

Table 2 shows the variation of OHCA outcomes across Japan. As Tokyo is the largest city in Japan, later it is set as a reference in regression analyses. In all sets of data set, it is observed that rates of one month survival after OHCA and favourable neurological outcome in Tokyo are below average values. Table 3 divides Japan into 7 regions, which is given by Hasegawa et al. (2013).

Table 4 reports one month survival rates which are grouped in the same region for all samples and witnessed cardiogenic arrests with VFVT are not similar, and it implies that there exists the variation of OHCA outcomes in each region. For the case of all samples, in East region one month survival in Saitama is larger than Ibaraki, Tochigi, and Tokyo. In Central region one month survivals in Aichi and Ishikawa are more than twice in Shizuoka and Mie. The maximum rate of one month survival is more than twice as much as the minimum one in other regions. Focusing on the case of witnessed cardiogenic arrests with VFVT, the variation of one month survival in each region is observed. We investigate whether this variation is robust or not by adopting a logit model.

3.3. Regression results

By using a logit model, differences of OHCA outcome across Japan are examined. One month survival and favourable neurological outcome are set as a dependent variable in the model. Male sex variable takes 1 if an arrest is male and 0 otherwise. Cardiogenic variable takes 1 if an arrest is cardiac and 0 otherwise. VF, Pulseless VT, PEA, and Asystole are dummy variables, which take 1 or 0, and a reference is given by the case that others is selected as the initial cardiac rhythm. Witnessed, CPR by bystanders, AED by bystanders, Medicine, Instrum, Emergency medical services are dummy variables take 1 or 0; witnessed or not, CPR is performed or not, AED is used or not, medicine are provided or not, instrument is used or not, EMS ride in ambulance or not. Furthermore, prefecture and year dummies are included in the model by setting Tokyo and 2005 as references.

Table 5 shows that one month survival rates in Iwate, Fukushima, Tochigi, Fukui and Tokushima are not statistically different from the one in Tokyo. All other prefecture dummies are significantly positive. It confirms that the rate of one month survival in Tokyo is the lowest level across Japan.

3.4 Sensitivity analyses

Focusing on cases of noncardiogenic, cardiogenic, and witnessed cardiogenic with VFVT, Tables 6 to

8 show the similar results to Table 5. Almost all the prefecture dummy variables are significantly positive. It is observed that in the region there exist the disparity of one month survival and neurological favourable outcome. Especially, in prefectures close to Tokyo, that is, Chiba, Saitama, and Kanagawa, outcomes of OHCA are superior to in Tokyo significantly.

4. Conclusions

The findings in this paper are shown below.

- 1) Disparity across Japan: The averages of one-month survival after OHCA grouped in the same region by Hasegawa et al. (2013) are not similar at all. This suggests that we need to investigate outcomes of OHCA based on finer regions than seven parts.
- 2) Controlling sex, age, witness status, and the time course from the receipt of an emergency call by the EMS through the initial contact with the patient and so on, an idiosyncratic effect to one-month survival and neurological favourable outcome in Tokyo is the lowest level in Japan.

To examine reasons of the disparity in emergency medical services should be the future research.

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Figure 1 Participant selection

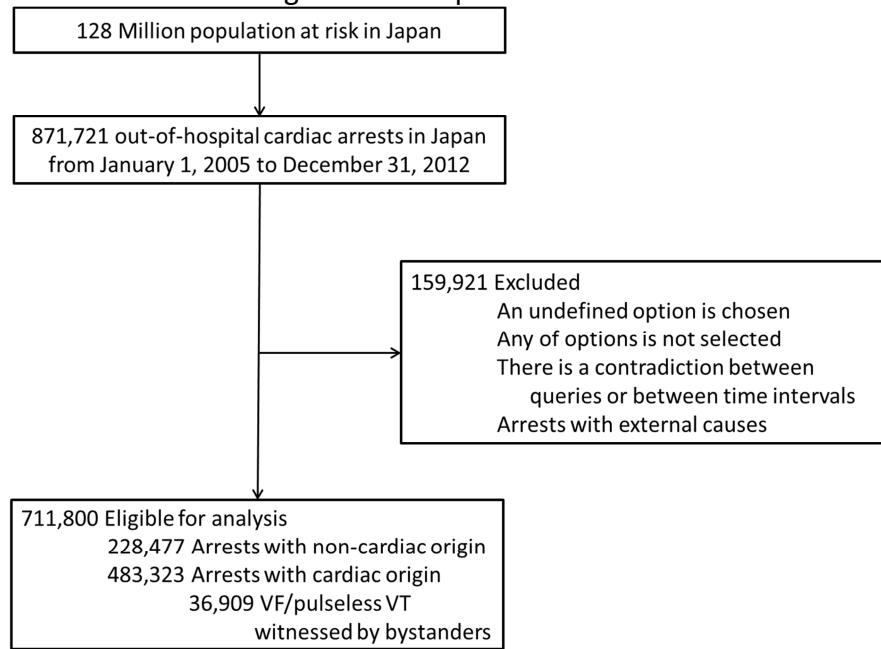


Table 1 Basic statistics

All samples (711,800)			Noncardiogenic (228,477)		Cardiogenic (483,323)		Witnessed cardiogenic with VFVT (36,909)	
	No	%	No	%	No	%	No	%
One month survival	30,983	4.35	7,644	3.35	23,339	4.83	10,724	29.06
Favourable neurological outcome	16,777	2.36	2,773	1.21	14,004	2.90	7,536	20.42
Male sex	303,143	42.59	97,305	42.59	205,838	42.59	7,736	20.96
Cardiogenic	483,323	67.90						
Definite	137,351	19.30			137,351	28.42	19,113	51.78
By exclusion	345,972	48.61			345,972	71.58	17,796	48.22
Noncardiogenic	228,477	32.10						
Cerebrovascular	38,509	5.41	38,509	16.85				
Pulmonary	50,883	7.15	50,883	22.27				
Cancer	29,525	4.15	29,525	12.92				
Others	109,560	15.39	109,560	47.95				
Initially identified cardiac rhythm								
Ventricular fibrillation (VF)	55,395	7.78	5,774	2.53	49,621	10.27		
Pulseless ventricular tachycardia (VT)	1,727	0.24	449	0.20	1,278	0.26		
Pulseless electrical activity (PEA)	149,466	21.00	53,867	23.58	95,599	19.78		
Aystole	475,978	66.87	156,735	68.60	319,243	66.05		
Others	29,234	4.11	11,652	5.10	17,582	3.64		
Witnessed cases	288,067	40.47	97,643	42.74	190,424	39.40		
Cardiopulmonary resuscitation (CPR) by bystanders	294,155	41.33	90,321	39.53	203,834	42.17	17,640	47.79
Automated external defibrillator (AED) by bystanders	5,055	0.71	932	0.41	4,123	0.85	901	2.44
Medicine	59,581	8.37	16,343	7.15	43,238	8.95	5,694	15.43
Instrument	305,785	42.96	88,772	38.85	217,013	44.90	15,970	43.27
Emergency medical technician	624,151	87.69	200,345	87.69	423,806	87.69	32,963	89.31
AGE	74.51	16.33	78	73.11	17.86	77	75.17	15.52
Call to CPR by Emergency medical service (EMS)	10.08	9.07	9	10.42	10.24	9	9.92	8.46
CPR by EMS to hospital arrival	22.58	14.85	21	22.43	14.08	21	22.65	15.20
	Mean	SD	Median	Mean	SD	Median	Mean	SD

Table 2 Variation of OHCA outcomes across Japan

All samples (711,800)		Noncardiogenic (228,477)				Cardiogenic (483,323)				Witnessed cardiogenic with VFVT (36,909)				
No	One month survival	Favourable neurological outcome		No	One month survival	Favourable neurological outcome		No	One month survival	Favourable neurological outcome		No	One month survival	Favourable neurological outcome
Hokkaido	30,437	0.06	0.03	9,973	0.04	0.02	20,464	0.06	0.04	1,832	0.32	0.21		
Aomori	9,983	0.04	0.02	2,950	0.03	0.01	7,033	0.04	0.02	519	0.28	0.19		
Iwate	9,852	0.03	0.01	2,934	0.02	0.01	6,918	0.03	0.02	465	0.23	0.15		
Miyagi	14,477	0.04	0.02	4,126	0.03	0.01	10,351	0.04	0.03	743	0.25	0.18		
Akita	8,289	0.04	0.02	2,509	0.03	0.01	5,780	0.04	0.03	416	0.32	0.23		
Yamagata	8,836	0.03	0.02	2,808	0.02	0.01	6,028	0.04	0.02	426	0.24	0.16		
Fukushima	13,804	0.03	0.02	2,769	0.03	0.01	11,035	0.03	0.02	737	0.23	0.17		
Ibaraki	18,019	0.03	0.02	6,021	0.03	0.01	11,998	0.03	0.02	856	0.23	0.17		
Tochigi	12,985	0.03	0.02	3,568	0.02	0.01	9,417	0.04	0.02	739	0.23	0.17		
Gunma	12,584	0.04	0.02	4,378	0.03	0.01	8,206	0.04	0.03	607	0.27	0.20		
Saitama	36,339	0.05	0.03	10,739	0.03	0.01	25,600	0.05	0.03	2,138	0.28	0.19		
Chiba	32,210	0.04	0.02	10,500	0.03	0.01	21,710	0.04	0.03	1,635	0.27	0.18		
Tokyo	77,916	0.03	0.02	27,784	0.02	0.01	50,132	0.03	0.02	3,095	0.20	0.14		
Kanagawa	48,691	0.04	0.02	15,094	0.03	0.01	33,597	0.05	0.03	2,365	0.29	0.20		
Niigata	15,939	0.04	0.02	6,280	0.03	0.01	9,659	0.04	0.03	849	0.29	0.22		
Toyama	6,239	0.05	0.03	2,654	0.04	0.02	3,585	0.06	0.04	346	0.29	0.22		
Ishikawa	5,669	0.06	0.04	2,097	0.04	0.02	3,572	0.07	0.05	385	0.35	0.25		
Fukui	3,869	0.03	0.02	1,466	0.02	0.01	2,403	0.03	0.02	183	0.26	0.20		
Yamanashi	5,544	0.03	0.02	1,568	0.03	0.01	3,976	0.04	0.03	256	0.28	0.23		
Nagano	14,854	0.03	0.02	6,334	0.03	0.01	8,520	0.04	0.02	676	0.25	0.18		
Gifu	13,564	0.04	0.02	3,317	0.04	0.01	10,247	0.04	0.03	592	0.31	0.24		
Shizuoka	24,008	0.03	0.02	10,285	0.02	0.01	13,723	0.04	0.02	1,173	0.24	0.16		
Aichi	37,154	0.06	0.03	9,626	0.05	0.02	27,528	0.06	0.04	2,272	0.37	0.27		
Mie	12,394	0.03	0.02	3,878	0.03	0.01	8,516	0.04	0.02	581	0.24	0.18		
Shiga	6,991	0.05	0.03	2,373	0.04	0.02	4,618	0.05	0.03	357	0.31	0.22		
Kyoto	13,707	0.05	0.03	3,412	0.05	0.02	10,295	0.06	0.03	860	0.33	0.21		
Osaka	43,083	0.07	0.04	8,329	0.05	0.02	34,754	0.07	0.04	2,660	0.38	0.26		
Hyogo	27,536	0.06	0.03	8,809	0.05	0.01	18,727	0.06	0.03	1,524	0.33	0.22		
Nara	6,791	0.03	0.02	1,109	0.03	0.01	5,682	0.04	0.02	368	0.24	0.17		
Wakayama	6,272	0.04	0.02	2,491	0.04	0.01	3,781	0.05	0.03	313	0.30	0.20		
Tottori	3,854	0.05	0.03	767	0.04	0.01	3,087	0.05	0.03	193	0.32	0.24		
Shimane	5,057	0.05	0.03	1,372	0.06	0.03	3,685	0.05	0.03	230	0.40	0.27		
Okayama	10,572	0.05	0.02	3,750	0.04	0.02	6,822	0.05	0.03	508	0.27	0.19		
Hiroshima	12,859	0.04	0.02	4,800	0.03	0.01	8,059	0.05	0.03	773	0.30	0.22		
Yamaguchi	7,987	0.04	0.02	2,612	0.04	0.01	5,375	0.04	0.03	391	0.27	0.19		
Tokushima	3,845	0.03	0.02	1,474	0.03	0.01	2,371	0.04	0.03	239	0.20	0.15		
Kagawa	5,272	0.04	0.02	1,703	0.04	0.01	3,569	0.04	0.03	234	0.24	0.19		
Ehime	8,691	0.03	0.02	2,189	0.04	0.01	6,502	0.03	0.02	374	0.26	0.20		
Kouchi	4,424	0.06	0.03	1,678	0.05	0.02	2,746	0.06	0.03	196	0.39	0.22		
Fukuoka	23,034	0.06	0.04	11,208	0.05	0.02	11,826	0.08	0.05	1,249	0.37	0.28		
Saga	4,349	0.04	0.03	1,924	0.03	0.01	2,425	0.05	0.04	225	0.29	0.21		
Nagasaki	6,962	0.04	0.02	2,576	0.03	0.01	4,386	0.04	0.03	387	0.25	0.18		
Kumamoto	9,580	0.05	0.02	2,945	0.04	0.02	6,635	0.05	0.03	501	0.25	0.17		
Oita	5,859	0.04	0.02	2,028	0.03	0.01	3,831	0.05	0.03	346	0.27	0.18		
Miyazaki	5,925	0.04	0.02	2,232	0.03	0.01	3,693	0.05	0.03	299	0.30	0.20		
Kagoshima	9,202	0.04	0.02	2,944	0.03	0.01	6,258	0.05	0.03	430	0.31	0.24		
Okinawa	6,292	0.07	0.03	2,094	0.06	0.02	4,198	0.08	0.04	366	0.38	0.25		

Table 3 Seven regions in Hasegawa et al. (2013)

North	Hokkaido
Northeast	Fukushima, Aomori, Iwate, Miyagi, Akita, Yamagata
East	Tokyo, Ibaraki, Tochigi, Gunma, Saitam, Chiba, Kanagawa, Niigata, Yamanashi, Nagano
Central	Toyama, Ishikawa, Gifu, Shizuoka, Aichi, Mie
Midwest	Kyoto, Osaka, Fukui, Shiga, Hyogo, Nara, Wakayama
West	Hiroshima, Tottori, Shimane, Okayama, Yamaguchi, Tokushima, Kagawa, Ehime, Kochi
South	Fukuoka, Saga, Nagasaki, Kumamoto, Oita, Miyazaki, Kagoshima, Okinawa

Table 4 Variation of OHCA outcomes in regions

All samples (711,800)			Witnessed cardiogenic with VFVT (36,909)		
Region	Prefecture	One month survival	Region	Prefecture	One month survival
East	Saitama	0.05	Northeast	Akita	0.32
	Ibaraki	0.03		Iwate	0.23
	Tochigi	0.03		Fukushima	0.23
	Tokyo	0.03		Kanagawa	0.29
Central	Aichi	0.06	East	Niigata	0.29
	Ishikawa	0.06		Ibaraki	0.23
	Shizuoka	0.03		Tochigi	0.23
	Mie	0.03		Tokyo	0.2
Midwest	Osaka	0.07	Central	Aichi	0.37
	Nara	0.03		Ishikawa	0.35
	Fukui	0.03		Shizuoka	0.24
West	Kouchi	0.06	Midwest	Mie	0.24
	Tokushima	0.03		Osaka	0.38
	Ehime	0.03		Nara	0.24
South	Okinawa	0.07	West	Shimane	0.4
	Saga	0.03		Kouchi	0.39
	Nagasaki	0.03		Tokushima	0.2
	Oita	0.03		Okinawa	0.38
	Miyazaki	0.03		Fukuoka	0.37
	Kagoshima	0.03		Nagasaki	0.25
				Kumamoto	0.25

Table 5 Regression results for all samples

All samples (711,800)												
Dependent	One month survival			One month survival			Favourable neurological outcome					
	Coefficient	P-value	95% confidence	Coefficient	P-value	95% confidence	Coefficient	P-value	95% confidence			
Constant	-3.75050***	0.02859	-3.80654	-3.69445	-54233***	0.08	-0.69	-0.39	-4.47085***	0.03947	-4.5482	-4.3935
Male sex				-0.01871	0.01	-0.05	0.01					
Age				-.02158***	0.00	-0.02	-0.02					
Cardiogenic				.07735***	0.02	0.05	0.11					
VF				.36691***	0.02	0.32	0.41					
Pulseless VT				.41563***	0.06	0.29	0.54					
PEA				-.10773***	0.02	-1.12	-1.03					
Asystole				-2.56353***	0.03	-2.61	-2.51					
Witnessed				.92045***	0.02	0.89	0.95					
CPR by bystanders				-.03110**	0.01	-0.06	0.00					
AED by bystanders				.97094***	0.04	0.89	1.06					
Medicine				-.34510***	0.02	-0.39	-0.30					
Instrument				-.62878***	0.02	-0.66	-0.60					
Emergency medical services				.29391***	0.03	0.24	0.34					
Call to CPE by EMS				-.47436***	0.02	-0.50	-0.44					
CPR by EMS to hospital arrival				-.03765***	0.01	-0.06	-0.01					
Hokkaido	.74124***	0.03	0.68	0.81	.88634***	0.04	0.82	0.96	.60307***	0.04	0.52	0.69
Aomori	.29099***	0.06	0.18	0.40	.38439***	0.06	0.26	0.50	0.12427	0.08	-0.03	0.28
Iwate	-.08171	0.07	-0.21	0.05	.09748	0.07	-0.04	0.24	-0.10381	0.09	-0.28	0.07
Miyagi	.26518***	0.05	0.17	0.36	.28043***	0.05	0.18	0.38	.25019***	0.06	0.12	0.38
Akita	.32252***	0.06	0.20	0.44	.28978***	0.07	0.16	0.42	.37084***	0.08	0.22	0.52
Yamagata	0.09265	0.06	-0.03	0.22	.13271*	0.07	0.00	0.27	0.03725	0.09	-0.13	0.21
Fukushima	0.05758	0.05	-0.05	0.16	.08036	0.06	-0.03	0.19	0.06352	0.07	-0.08	0.20
Ibaraki	.09642**	0.05	0.00	0.19	.17989***	0.05	0.08	0.28	0.0435	0.06	-0.08	0.17
Tochigi	.11918**	0.05	0.01	0.23	-.01339	0.06	-0.13	0.10	.18144***	0.07	0.05	0.32
Gunma	.35634***	0.05	0.26	0.45	.28055***	0.05	0.17	0.39	.27856***	0.07	0.15	0.41
Saitama	.48154***	0.03	0.42	0.55	.62191***	0.04	0.55	0.69	.44454***	0.04	0.36	0.53
Chiba	.31350***	0.04	0.24	0.38	.34085***	0.04	0.26	0.42	.20536***	0.05	0.11	0.30
Kanagawa	.40545***	0.03	0.34	0.47	.60245***	0.03	0.54	0.67	.25673***	0.04	0.17	0.34
Niigata	.25787***	0.05	0.17	0.35	.48417***	0.05	0.38	0.58	.33637***	0.06	0.22	0.45
Toyama	.55518***	0.06	0.43	0.68	.54519***	0.07	0.41	0.68	.55048***	0.08	0.39	0.71
Ishikawa	.75629***	0.06	0.64	0.87	.75492***	0.07	0.62	0.89	.82290***	0.08	0.67	0.97
Fukui	0.06202	0.10	-0.13	0.25	0.10911	0.10	-0.09	0.31	0.04543	0.13	-0.20	0.30
Yamanashi	.17289**	0.08	0.02	0.33	.62258***	0.08	0.46	0.79	.27726***	0.10	0.09	0.47
Nagano	.12836**	0.05	0.03	0.23	.27572***	0.05	0.17	0.38	0.02855	0.07	-0.11	0.17
Gifu	.38279***	0.05	0.29	0.48	.71132***	0.05	0.61	0.81	.33087***	0.06	0.20	0.46
Shizuoka	.15163***	0.04	0.07	0.23	.29564***	0.05	0.21	0.38	.10387*	0.06	-0.01	0.21
Aichi	.72530***	0.03	0.66	0.79	.90297***	0.03	0.84	0.97	.66471***	0.04	0.58	0.75
Mie	.20734***	0.05	0.10	0.31	.36937***	0.06	0.26	0.48	0.06149	0.07	-0.08	0.21
Shiga	.57831***	0.06	0.46	0.69	.71415***	0.06	0.59	0.84	.49546***	0.08	0.34	0.65
Kyoto	.66388***	0.04	0.58	0.75	.74859***	0.05	0.65	0.84	.52755***	0.06	0.41	0.64
Osaka	.91602***	0.03	0.86	0.97	.94259***	0.03	0.88	1.01	.87826***	0.04	0.80	0.95
Hyogo	.71658***	0.03	0.65	0.78	.90119***	0.04	0.83	0.97	.51187***	0.05	0.42	0.60
Nara	.19986***	0.07	0.06	0.34	.37433***	0.07	0.23	0.52	.22998**	0.09	0.05	0.41
Wakayama	.45927***	0.06	0.33	0.59	.75813***	0.07	0.62	0.90	.33672***	0.09	0.16	0.51
Tottori	.48286***	0.08	0.33	0.64	.80783***	0.09	0.64	0.98	.46152***	0.11	0.25	0.67
Shimane	.59997***	0.07	0.47	0.73	1.03867***	0.07	0.89	1.18	.59392***	0.09	0.42	0.77
Okayama	.48440***	0.05	0.38	0.59	.70904***	0.06	0.60	0.82	.31609***	0.07	0.18	0.46
Hiroshima	.38846***	0.05	0.29	0.48	.31030***	0.05	0.21	0.41	.31976***	0.07	0.19	0.45
Yamaguchi	.37181***	0.06	0.25	0.49	.47381***	0.07	0.35	0.60	.22771***	0.08	0.06	0.39
Tokushima	.19826**	0.09	0.02	0.38	-.01215	0.10	-0.20	0.18	.25670**	0.12	0.03	0.48
Kagawa	.24660***	0.08	0.10	0.40	.52322***	0.08	0.36	0.69	.22087**	0.10	0.02	0.42
Ehime	.14031**	0.06	0.01	0.27	.35644***	0.07	0.22	0.49	0.10215	0.09	-0.06	0.27
Kouchi	.72284***	0.07	0.59	0.86	.78559***	0.08	0.64	0.93	.44835***	0.10	0.25	0.64
Fukuoka	.83279***	0.03	0.76	0.90	.86237***	0.04	0.79	0.94	.82097***	0.05	0.73	0.91
Saga	.42788***	0.08	0.28	0.58	.39964***	0.08	0.23	0.57	.47697***	0.10	0.28	0.67
Nagasaki	.31217***	0.07	0.18	0.44	.29613***	0.07	0.16	0.43	.30545***	0.09	0.14	0.47
Kumamoto	.49928***	0.05	0.39	0.60	.53103***	0.06	0.42	0.64	.34622***	0.07	0.20	0.49
Oita	.41755***	0.07	0.28	0.55	.35422***	0.07	0.21	0.50	.21428**	0.10	0.02	0.40
Miyazaki	.34862***	0.07	0.21	0.49	.31223***	0.08	0.16	0.46	.32833***	0.09	0.15	0.51
Kagoshima	.39002***	0.06	0.28	0.50	.51707***	0.06	0.40	0.64	.29764***	0.08	0.15	0.45
Okinawa	.93475***	0.05	0.83	1.04	.97999***	0.06	0.86	1.10	.69414***	0.08	0.54	0.84
Year2006	0.03692	0.03	-0.02	0.09	0.02778	0.03	-0.03	0.09	0.05036	0.04	-0.03	0.13
Year2007	.20564***	0.03	0.15	0.26	.21446***	0.03	0.16	0.27	.35561***	0.04	0.28	0.43
Year2008	.21622***	0.03	0.17	0.27	.21437***	0.03	0.16	0.27	.36991***	0.04	0.30	0.44
Year2009	.27406***	0.03	0.22	0.32	.50570***	0.03	0.45	0.57	.46009***	0.04	0.39	0.53
Year2010	.30923***	0.03	0.26	0.36	.38877***	0.03	0.34	0.44	.49541***	0.04	0.43	0.56
Year2011	.30692***	0.02	0.26	0.36	.41913***	0.03	0.37	0.47	.51610***	0.03	0.45	0.58
Year2012	.31870***	0.02	0.27	0.37	.45639***	0.03	0.40	0.51	.51135***	0.03	0.44	0.58
Chi-square statistics		2778.03		66106.08			1732.17					
DF		58		68			53					
P-value		0		0			0					
McFadden pseude R^2		0.01		0.26			0.01					

Table 6 Regression results for noncardiogenic arrests

Noncardiogenic (228,477)																
Dependent	One month survival				One month survival				Favourable neurological outcome			Favourable neurological outcome				
	Coefficient	P-value	95% confidence		Coefficient	P-value	95% confidence		Coefficient	P-value	95% confidence	Coefficient	P-value	95% confidence		
Constant	-4.07351***	0.05682	-4.18488	-3.96214	-4.45250***	0.14	-0.73	-0.18	-5.07545***	0.09214	-5.25603	-4.89486	-1.60057***	0.22	-2.03	-1.17
Male sex					0.07418***	0.02	0.03	0.12					-0.03144	0.04	-0.11	0.05
Age					-0.01922***	0.00	-0.02	-0.02					-0.02044***	0.00	-0.02	-0.02
Cerebrovascular					-0.15125***	0.03	-0.22	-0.09					-0.29031***	0.05	-0.40	-0.19
Pulmonary					0.33581***	0.03	0.28	0.39					0.05509	0.05	-0.04	0.15
Cancer					-1.60359***	0.07	-1.75	-1.46					-1.66656***	0.12	-1.90	-1.43
VF					-0.16177***	0.05	-0.26	-0.06					-0.09326	0.07	-0.23	0.04
Pulseless VT					-0.05369	0.15	-0.35	0.24					0.0318	0.19	-0.35	0.41
PEA					-0.89297***	0.04	-0.96	-0.82					-1.29885***	0.05	-1.40	-1.20
Aystole					-2.31150***	0.04	-2.39	-2.23					-3.24329***	0.07	-3.38	-3.11
Witnessed					0.86390***	0.03	0.81	0.92					0.83248***	0.05	0.73	0.93
CPR by bystanders					-0.03311	0.03	-0.08	0.02					-0.08267*	0.04	-0.17	0.00
AED by bystanders					0.43869***	0.14	0.17	0.71					0.51155**	0.21	0.11	0.92
Medicine					-0.20309***	0.05	-0.30	-0.11					-0.74332***	0.10	-0.94	-0.55
Instrum					-0.41217***	0.03	-0.47	-0.36					-1.03323***	0.05	-1.14	-0.93
Emergency medical services					2.1481***	0.05	0.12	0.31					0.35426***	0.08	0.20	0.51
Call to CPE by EMS					-0.59777***	0.03	-0.65	-0.54					-0.57285***	0.04	-0.66	-0.49
CPR by EMS to hospital arrival					-0.00891	0.02	-0.06	0.04					0.18288***	0.04	0.11	0.25
Hokkaido	0.91175***	0.07	0.78	1.04	0.91627***	0.07	0.78	1.05	0.68375***	0.11	0.47	0.89	0.85474***	0.11	0.63	1.08
Aomori	0.40633***	0.12	0.17	0.64	0.47049***	0.13	0.22	0.72	0.20593	0.20	-0.19	0.60	0.42730***	0.21	0.02	0.84
Iwate	0.05778	0.14	-0.22	0.33	0.21053	0.15	-0.07	0.50	0.06518	0.22	-0.36	0.49	0.38210	0.22	-0.05	0.82
Miyagi	0.32919***	0.11	0.12	0.54	0.25660***	0.11	0.04	0.48	0.32184*	0.17	0.00	0.65	0.29441*	0.17	-0.04	0.63
Akita	0.57395***	0.12	0.34	0.81	0.42687***	0.13	0.18	0.67	0.50812***	0.19	0.13	0.88	0.36328*	0.20	0.00	0.77
Yamagata	0.19228	0.14	-0.07	0.46	0.15027	0.14	-0.12	0.42	-0.19788	0.25	-0.68	0.28	-0.13633	0.25	-0.63	0.36
Fukushima	0.43783***	0.12	0.20	0.68	0.38654***	0.13	0.14	0.64	0.16239	0.21	-0.25	0.58	0.1679	0.22	-0.26	0.60
Ibaraki	0.41253***	0.09	0.24	0.59	0.48055***	0.09	0.30	0.66	0.27467*	0.15	-0.01	0.56	0.41034***	0.15	0.12	0.70
Tochigi	0.10974	0.13	-0.14	0.36	0.01864	0.13	-0.24	0.27	-0.09437	0.21	-0.51	0.32	-0.16448	0.22	-0.59	0.26
Gunma	0.57254***	0.10	0.38	0.76	0.50237***	0.10	0.31	0.70	0.62172***	0.15	0.34	0.91	0.58774***	0.15	0.29	0.88
Saitama	0.49768***	0.07	0.36	0.64	0.55803***	0.08	0.41	0.71	0.40409***	0.11	0.18	0.63	0.65876***	0.12	0.43	0.89
Chiba	0.41632***	0.07	0.27	0.56	0.43352***	0.08	0.28	0.58	0.24891**	0.12	0.01	0.48	0.33885***	0.12	0.10	0.58
Kanagawa	0.53040***	0.06	0.40	0.66	0.62862***	0.07	0.50	0.76	0.0615	0.11	-0.16	0.28	0.34615***	0.12	0.12	0.58
Niigata	0.33481***	0.09	0.16	0.51	0.49133***	0.09	0.31	0.68	0.35682***	0.14	0.09	0.63	0.72205***	0.14	0.44	1.00
Toyama	0.78434***	0.11	0.57	1.00	0.77947***	0.11	0.56	1.00	0.72970***	0.17	0.40	1.06	0.81284***	0.18	0.47	1.16
Ishikawa	0.77712***	0.12	0.54	1.01	0.72006***	0.13	0.47	0.97	0.82295***	0.18	0.47	1.17	0.92766***	0.19	0.56	1.29
Fukui	0.20289	0.18	-0.15	0.56	0.20145	0.19	-0.17	0.57	0.13909	0.29	-0.42	0.70	0.2976	0.30	-0.29	0.88
Yamanashi	0.41947***	0.16	0.10	0.73	0.67864***	0.17	0.35	1.01	0.42194*	0.25	-0.06	0.91	0.92835***	0.26	0.42	1.44
Nagano	0.39961***	0.09	0.23	0.57	0.46233***	0.09	0.28	0.64	0.21965	0.15	-0.07	0.51	0.43720***	0.15	0.14	0.73
Gifu	0.75560***	0.10	0.56	0.95	0.90399***	0.11	0.70	1.11	0.50520***	0.17	0.17	0.84	0.83080***	0.18	0.48	1.18
Shizuoka	0.28618***	0.08	0.13	0.44	0.31739***	0.08	0.16	0.48	0.17411	0.12	-0.07	0.42	0.38301***	0.13	0.13	0.63
Aichi	0.91423***	0.07	0.78	1.04	0.91823***	0.07	0.78	1.06	0.66596***	0.11	0.45	0.88	0.92276***	0.11	0.70	1.15
Mie	0.58713***	0.10	0.39	0.78	0.66237***	0.11	0.46	0.87	0.45097***	0.16	0.13	0.77	0.64457***	0.17	0.31	0.97
Shiga	0.91043***	0.11	0.70	1.12	0.96880***	0.11	0.74	1.19	0.77548***	0.18	0.43	1.12	0.99324***	0.18	0.63	1.35
Kyoto	1.02957***	0.09	0.85	1.21	0.95145***	0.10	0.76	1.14	0.88638***	0.14	0.60	1.17	0.95641***	0.15	0.66	1.25
Osaka	1.11578***	0.07	0.99	1.24	0.88675***	0.07	0.75	1.02	1.07491***	0.10	0.88	1.27	0.95495***	0.11	0.74	1.17
Hyogo	1.02623***	0.07	0.90	1.16	1.01197***	0.07	0.87	1.15	0.66761***	0.11	0.45	0.89	0.82759***	0.12	0.60	1.06
Nara	0.35430*	0.19	-0.02	0.73	0.32649	0.20	-0.07	0.72	0.48954*	0.28	-0.05	1.03	0.59851*	0.29	0.03	0.83
Wakayama	0.74156***	0.11	0.52	0.96	0.88104***	0.12	0.65	1.11	0.50541***	0.19	0.13	0.88	0.93444***	0.20	0.56	1.34
Tottori	0.85169***	0.19	0.49	1.22	0.88765***	0.19	0.51	1.27	0.54648*	0.33	-0.09	1.18	0.74902*	0.34	0.08	1.41
Shimane	1.19430***	0.12	0.95	1.44	1.38204***	0.13	1.12	1.64	1.42819***	0.17	1.10	1.76	1.89387***	0.18	1.54	2.25
Okayama	0.87735***	0.09	0.70	1.06	0.91014***	0.10	0.72	1.10	0.68645***	0.15	0.39	0.98	0.87121***	0.16	0.56	1.18
Hiroshima	0.47754***	0.10	0.29	0.67	0.39521***	0.10	0.20	0.59	0.12588	0.17	-0.21	0.46	0.104	0.17	-0.24	0.44
Yamaguchi	0.69473***	0.11	0.47	0.92	0.71712***	0.12	0.48	0.95	0.21054	0.21	-0.21	0.63	0.28974	0.22	-0.14	0.72
Tokushima	0.41710**	0.16	0.09	0.74	0.79235*	0.17	-0.04	0.63	0.39833	0.25	-0.10	0.89	0.37272	0.26	-0.14	0.89
Kagawa	0.70932***	0.14	0.44	0.98	0.84733***	0.14	0.57	1.13	0.30304	0.25	-0.18	0.79	0.66328***	0.26	0.16	1.16
Ehime	0.70134***	0.12	0.46	0.94	0.73261***	0.13	0.48	0.98	0.47164**	0.21	0.07	0.87	0.60568***	0.21	0.19	1.02
Kouchi	0.94428***	0.12	0.70	1.19	0.85619***	0.13	0.60	1.11	0.69030***	0.21	0.28	1.10	0.63206***	0.22	0.21	1.06
Fukuoka	1.02919***	0.06	0.91	1.15	0.99600***	0.07	0.87	1.13	1.00512***	0.10	0.82	1.19	1.11984***	0.10	0.92	1.32
Saga	0.48407***	0.14	0.21	0.76	0.42467***	0.15	0.14	0.71	0.47969***	0.22	0.06	0.90	0.49821*	0.22	0.05	0.93
Nagasaki	0.51551***	0.12	0.28	0.76	0.52105***	0.13	0.27	0.77	0.40662**	0.20	0.02	0.70	0.43761**	0.20	0.04	0.83
Kumamoto	0.75784***	0.11	0.55	0.97	0.72667***	0.11	0.51	0.94	0.71856***	0.16	0.40	1.04	0.76429***	0.17	0.43	1.10
Oita	0.63873***	0.13	0.38	0.89	0.59708***	0.13	0.33	0.86	0.13302	0.25	-0.35	0.62	0.16202	0.25	-0.33	0.66
Miyazaki	0.40441***	0.14	0.14	0.67	0.32102**	0.14	0.04	0.60	0.15233	0.23	-0.31	0.61	0.10646	0.24	-0.37	0.58
Kagoshima	0.64068***	0.11	0.42	0.86	0.69916***	0.12	0.47	0.93	0.09781	0.21	-0.32	0.51	0.23502	0.22	-0.19	0.66
Okinawa	1.17216***	0.10	0.97	1.38	1.05485***	0.11	0.84	1.27	0.84342***	0.18	0.50	1.19	0.89966***	0.19	0.53	1.27
Year2006	0.0063	0.05	-0.09	0.11	0.00269	0.05	-0.10	0.11	0.07755	0.09	-0.09	0.25	0.07224	0.09	-0.10	0.25
Year2007	0.03965	0.05	-0.0													

Table 7 Regression results for cardiogenic arrests

Cardiogenic (483,323)													
Dependent	One month survival			One month survival			Favourable neurological outcome						
	Coefficient	P-value	95% confidence	Coefficient	P-value	95% confidence	Coefficient	P-value	95% confidence				
Constant	-3.60584***	0.03316	-3.67084	-3.54084		-65269***	0.09	-0.83	-0.48	-4.22969***	0.04365	-4.31523	-4.14414
Male sex						-03675**	0.02	-0.07	0.00				
Age						-02289***	0.00	-0.02	-0.02				
Definite						.63177***	0.02	0.60	0.66				
VF						.30730***	0.03	0.25	0.36				
Pulseless VT						.46723***	0.07	0.33	0.61				
PEA						-1.19087***	0.03	-1.25	-1.14				
Asystole						-2.67323***	0.03	-2.74	-2.61				
Witnessed						.88297***	0.02	0.85	0.92				
CPR by bystanders						-.05521***	0.02	-0.09	-0.02				
AED by bystanders						.95859***	0.05	0.87	1.05				
Medicine						-.40632***	0.03	-0.46	-0.35				
Instrum						-.69291***	0.02	-0.73	-0.66				
Emergency medical services						.30526***	0.03	0.25	0.37				
Call to CPE by EMS						-.43377***	0.02	-0.47	-0.40				
CPR by EMS to hospital arrival						-.03698**	0.02	-0.07	-0.01				
Hokkaido	.66745***	0.04	0.59	0.74	.74276***	0.04	0.66	0.83	.55731***	0.05	0.46	0.65	
Aomori	.21629***	0.06	0.09	0.34	.29480***	0.07	0.15	0.44	0.04783	0.09	-0.12	0.22	
Iwate	-.16436**	0.08	-0.31	-0.02	0.01292	0.08	-0.15	0.17	-.19818**	0.10	-0.39	-0.01	
Miyagi	.19989***	0.06	0.09	0.31	.26359***	0.06	0.14	0.38	.16925**	0.07	0.03	0.31	
Akita	.20675***	0.07	0.07	0.34	.09452	0.08	-0.06	0.25	.28687***	0.09	0.12	0.45	
Yamagata	0.03491	0.07	-0.11	0.18	0.00147	0.08	-0.16	0.16	0.03463	0.09	-0.15	0.22	
Fukushima	-.11486*	0.06	-0.23	0.00	0.05296	0.07	-0.08	0.18	-.08798	0.08	-0.24	0.06	
Ibaraki	-.0324	0.06	-0.14	0.08	0.02246	0.06	-0.10	0.14	-.03582	0.07	-0.18	0.10	
Tochigi	0.06299	0.06	-0.06	0.18	-.13041**	0.07	-0.26	0.00	.13607*	0.07	-0.01	0.28	
Gunma	.27257***	0.06	0.16	0.39	.18106***	0.06	0.05	0.31	.17680**	0.08	0.03	0.33	
Saitama	.42791***	0.04	0.35	0.50	.66996***	0.04	0.59	0.75	.37997***	0.05	0.29	0.47	
Chiba	.25853***	0.04	0.18	0.34	.27160***	0.05	0.18	0.36	.16202***	0.05	0.06	0.27	
Kanagawa	.33454***	0.04	0.26	0.40	.63650***	0.04	0.56	0.72	.23676***	0.05	0.15	0.33	
Niigata	.25879***	0.06	0.15	0.37	.35056***	0.06	0.23	0.47	.37240***	0.07	0.24	0.50	
Toyama	.50877***	0.08	0.36	0.66	.37681***	0.09	0.21	0.55	.57830***	0.09	0.40	0.76	
Ishikawa	.76290***	0.07	0.63	0.90	.47750***	0.08	0.32	0.63	.84285***	0.08	0.68	1.01	
Fukui	0.025	0.11	-0.20	0.25	-.1296	0.12	-0.37	0.11	.0431	0.14	-0.24	0.32	
Yamanashi	0.04941	0.09	-0.12	0.22	.62219***	0.10	0.43	0.82	0.17063	0.11	-0.04	0.38	
Nagano	0.05344	0.06	-0.07	0.18	0.07504	0.07	-0.06	0.21	0.04477	0.08	-0.11	0.20	
Gifu	.21759***	0.05	0.11	0.33	.67660***	0.06	0.56	0.80	.19905***	0.07	0.06	0.34	
Shizuoka	.14836***	0.05	0.05	0.25	.23702***	0.06	0.13	0.35	.15789**	0.06	0.03	0.28	
Aichi	.61819***	0.04	0.55	0.69	.78686***	0.04	0.71	0.87	.57948***	0.04	0.49	0.67	
Mie	0.04896	0.06	-0.07	0.17	.13119*	0.07	-0.01	0.27	-.07162	0.08	-0.24	0.09	
Shiga	.44177***	0.07	0.30	0.58	.58287***	0.08	0.43	0.74	.40348***	0.09	0.23	0.58	
Kyoto	.50041***	0.05	0.40	0.60	.65293***	0.06	0.54	0.76	.36464***	0.07	0.24	0.49	
Osaka	.77915***	0.03	0.72	0.84	.86279***	0.04	0.79	0.94	.71030***	0.04	0.63	0.79	
Hyogo	.58693***	0.04	0.51	0.66	.83415***	0.04	0.75	0.92	.43961***	0.05	0.34	0.54	
Nara	0.06037	0.07	-0.09	0.21	.34769***	0.08	0.19	0.51	0.03893	0.10	-0.15	0.23	
Wakayama	.36933***	0.08	0.21	0.53	.49811***	0.09	0.32	0.67	.33527***	0.10	0.14	0.53	
Tottori	.31121***	0.09	0.14	0.49	.80167***	0.10	0.60	1.00	.30781***	0.11	0.09	0.53	
Shimane	.35145***	0.08	0.19	0.51	.88893***	0.09	0.71	1.07	.29866***	0.10	0.10	0.50	
Okayama	.32363***	0.06	0.20	0.45	.47896***	0.07	0.34	0.62	.21304***	0.08	0.05	0.37	
Hiroshima	.36846***	0.06	0.26	0.48	0.09247	0.06	-0.03	0.22	.37075***	0.07	0.23	0.51	
Yamaguchi	.23998***	0.07	0.10	0.38	.36460***	0.08	0.21	0.52	.19959**	0.09	0.02	0.38	
Tokushima	0.13107	0.11	-0.08	0.35	-.24042**	0.12	-0.47	-0.01	.24718*	0.13	-0.01	0.50	
Kagawa	0.05241	0.09	-0.13	0.23	.35164***	0.10	0.15	0.55	0.17011	0.11	-0.05	0.39	
Ehime	-.090966	0.08	-0.24	0.06	.23562***	0.08	0.07	0.40	-.0619	0.09	-0.25	0.12	
Kouchi	.65609***	0.08	0.50	0.82	.65881***	0.09	0.48	0.84	.41313***	0.11	0.19	0.64	
Fukuoka	.84011***	0.04	0.76	0.92	.69328***	0.05	0.60	0.79	.91269***	0.05	0.81	1.01	
Saga	.47240***	0.09	0.29	0.66	.31599***	0.11	0.11	0.52	.56782***	0.11	0.35	0.79	
Nagasaki	.24461***	0.08	0.09	0.40	0.1183	0.09	-0.05	0.29	.29303***	0.10	0.10	0.48	
Kumamoto	.38349***	0.06	0.26	0.50	.40906***	0.07	0.27	0.54	.21081**	0.08	0.05	0.37	
Oita	.33208***	0.08	0.18	0.49	0.13883	0.09	-0.04	0.31	.21571**	0.11	0.01	0.42	
Miyazaki	.34145***	0.08	0.18	0.50	.25629***	0.09	0.08	0.43	.37856***	0.10	0.18	0.57	
Kagoshima	.28309***	0.07	0.15	0.41	.36004***	0.07	0.22	0.50	.28884***	0.08	0.13	0.45	
Okinawa	.84089***	0.06	0.72	0.96	.96661***	0.07	0.82	1.11	.64207***	0.08	0.48	0.81	
Year2006	0.0511	0.03	-0.01	0.11	.06335*	0.04	-0.01	0.13	0.04111	0.04	-0.05	0.13	
Year2007	.27215***	0.03	0.21	0.33	.32093***	0.03	0.25	0.39	.39867***	0.04	0.32	0.48	
Year2008	.25736***	0.03	0.20	0.32	.32056***	0.03	0.25	0.39	.40318***	0.04	0.32	0.48	
Year2009	.34022***	0.03	0.28	0.40	.66015***	0.04	0.59	0.73	.48625***	0.04	0.41	0.56	
Year2010	.35880***	0.03	0.30	0.42	.51613***	0.03	0.45	0.58	.52166***	0.04	0.44	0.60	
Year2011	.35864***	0.03	0.30	0.42	.57758***	0.03	0.51	0.64	.54288***	0.04	0.47	0.62	
Year2012	.34773***	0.03	0.29	0.40	.58826***	0.03	0.52	0.65	.53176***	0.04	0.46	0.61	
Chi-square statistics			2021.57		57654.05				1396.13				
DF			53		68				53				
P-value			0		0				0				
McFadden pseude R^2			0.01		0.31				0.01				

Table 8 Regression results for witnessed cardiogenic arrests with VFVT

Witnessed cardiogenic with VFVT (36,909)																			
Dependent	One month survival			One month survival			Favourable neurological outcome			Favourable neurological outcome									
	Coefficient	P-value	95% confidence	Coefficient	P-value	95% confidence	Coefficient	P-value	95% confidence	Coefficient	P-value	95% confidence							
Constant	-1.86870***	0.06015	-1.9866 -1.7508	3.2406***	0.15	0.04	0.61	-2.38249***	0.07065	-2.52096	-2.24401	-46214***	0.16	-0.78	-0.14				
Male sex				.12789***	0.03	0.07	0.19					.07478**	0.04	0.01	0.14				
Age				-.02147***	0.00	-0.02	-0.02					-.02562***	0.00	-0.03	-0.02				
Definite				.81611***	0.03	0.77	0.87					.90671***	0.03	0.85	0.97				
CPR by bystanders				.11661***	0.03	0.07	0.17					.18430***	0.03	0.13	0.24				
AED by bystanders				.18922**	0.08	0.04	0.34					.32686***	0.08	0.17	0.49				
Medicine				-.68348***	0.04	-0.76	-0.60					-.106659***	0.05	-1.17	-0.96				
Instrum				-.86331***	0.03	-0.92	-0.81					-.121228***	0.03	-1.28	-1.15				
Emergency medical services				.29278***	0.05	0.19	0.39					.36132***	0.06	0.25	0.47				
Call to CPE by EMS				-.44113***	0.03	-0.50	-0.38					-.28477***	0.03	-0.35	-0.22				
CPR by EMS to hospital arrival				-.14208***	0.03	-0.19	-0.09					-.11174***	0.03	-0.17	-0.05				
Hokkaido	.68362***	0.07	0.55	0.82	.78804***	0.07	0.64	0.93	.50765***	0.08	0.36	0.66	.68435***	0.08	0.52	0.85			
Aomori	.46067***	0.11	0.25	0.67	.43920***	0.12	0.21	0.66	.34921***	0.12	0.11	0.59	.32592***	0.13	0.06	0.59			
Iwate	0.1873	0.12	-0.05	0.42	0.19705	0.13	-0.05	0.45	0.07375	0.14	-0.20	0.35	0.08955	0.15	-0.20	0.38			
Miyagi	.32760***	0.10	0.14	0.52	.27917***	0.10	0.08	0.48	.31447***	0.11	0.10	0.53	.22084*	0.12	-0.01	0.45			
Akita	.66941***	0.12	0.44	0.90	.32512***	0.12	0.09	0.56	.65094***	0.13	0.40	0.9	.25874*	0.14	-0.01	0.52			
Yamagata	.27311***	0.12	0.03	0.51	0.10918	0.13	-0.14	0.36	0.17418	0.14	-0.10	0.45	-.0322	0.15	-0.33	0.26			
Fukushima	.18769*	0.10	-0.01	0.38	.22432**	0.10	0.02	0.43	.21711*	0.11	0.00	0.44	.22934*	0.12	0.00	0.46			
Ibaraki	.18899**	0.09	0.01	0.37	0.14564	0.10	-0.05	0.34	.22863**	0.10	0.02	0.43	0.15228	0.11	-0.07	0.37			
Tochigi	.21748**	0.10	0.02	0.41	-.04732	0.10	-0.25	0.15	.22983**	0.11	0.01	0.45	-.10011	0.12	-0.33	0.13			
Gunma	.42799***	0.10	0.23	0.63	.22586**	0.11	0.02	0.43	.41367***	0.11	0.19	0.64	.16178	0.12	-0.07	0.40			
Saitama	.47080***	0.07	0.34	0.60	.88822***	0.07	0.75	1.03	.35761***	0.08	0.21	0.51	.87209***	0.08	0.71	1.03			
Chiba	.40802***	0.07	0.27	0.55	.43812***	0.08	0.29	0.59	.27031***	0.08	0.11	0.43	.25209***	0.09	0.08	0.43			
Kanagawa	.54178***	0.06	0.42	0.67	.80206***	0.07	0.67	0.94	.44804***	0.07	0.30	0.59	.78238***	0.08	0.63	0.94			
Niigata	.50679***	0.09	0.33	0.68	.62130***	0.09	0.44	0.81	.54733***	0.10	0.35	0.74	.72303***	0.11	0.51	0.93			
Toyama	.52417***	0.13	0.27	0.77	.38476***	0.13	0.12	0.65	.54687***	0.14	0.27	0.82	.41086***	0.15	0.12	0.70			
Ishikawa	.82730***	0.12	0.60	1.06	.57564***	0.12	0.33	0.82	.76404***	0.13	0.51	1.02	.52589***	0.14	0.26	0.80			
Fukui	.36424***	0.17	0.02	0.71	0.10986	0.18	-0.25	0.47	.41916***	0.19	0.04	0.80	.17834	0.20	-0.22	0.58			
Yamanashi	.49085***	0.15	0.20	0.78	.99139***	0.16	0.68	1.30	.60781***	0.16	0.30	0.92	.124703***	0.18	0.90	1.59			
Nagano	.31530***	0.10	0.12	0.51	.24351**	0.11	0.04	0.45	.29268***	0.11	0.07	0.52	.19417	0.12	-0.04	0.43			
Gifu	.64225***	0.10	0.45	0.84	.88565***	0.11	0.68	1.09	.68141***	0.11	0.47	0.90	.99675***	0.12	0.76	1.23			
Shizuoka	.28108***	0.08	0.12	0.44	.47131***	0.09	0.30	0.64	0.14347	0.10	-0.04	0.33	.35651***	0.10	0.16	0.57			
Aichi	.90123***	0.06	0.78	1.02	.101060***	0.07	0.88	1.14	.80049***	0.07	0.66	0.94	.96808***	0.08	0.82	1.12			
Mie	.27789***	0.11	0.07	0.49	.22095*	0.11	0.00	0.44	.28279**	0.12	0.05	0.52	.20501	0.13	-0.05	0.46			
Shiga	.62370***	0.12	0.38	0.87	.65640***	0.13	0.40	0.91	.56494***	0.14	0.29	0.84	.63883***	0.15	0.35	0.93			
Kyoto	.73021***	0.09	0.56	0.90	.95210***	0.09	0.77	1.13	.51833***	0.10	0.33	0.71	.80851***	0.11	0.60	1.02			
Osaka	.93215***	0.06	0.81	1.05	.107665***	0.07	0.95	1.21	.80410***	0.07	0.67	0.94	.10543***	0.08	0.91	1.20			
Hyogo	.71643***	0.07	0.58	0.86	.98786***	0.08	0.84	1.14	.58016***	0.08	0.42	0.74	.91752***	0.09	0.74	1.09			
Nara	.26178**	0.13	0.01	0.52	.55553***	0.14	0.28	0.82	.24533*	0.15	-0.04	0.53	.61419***	0.16	0.30	0.93			
Wakayama	.58045***	0.13	0.32	0.84	.65876***	0.14	0.38	0.93	.47394***	0.15	0.18	0.77	.59509***	0.16	0.28	0.91			
Tottori	.67656***	0.16	0.36	0.99	.99300***	0.17	0.65	1.34	.69735***	0.18	0.35	1.03	.100604***	0.20	0.68	1.44			
Shimane	1.02200***	0.14	0.74	1.30	.138217***	0.15	1.08	1.69	.83345***	0.16	0.52	1.15	.125088***	0.18	0.91	1.59			
Okayama	.41805***	0.11	0.20	0.63	.46806***	0.12	0.24	0.70	.38315***	0.12	0.14	0.63	.46910***	0.13	0.21	0.73			
Hiroshima	.51712***	0.09	0.39	0.75	.24097**	0.10	0.05	0.43	.59338***	0.10	0.39	0.79	.21699*	0.11	0.01	0.43			
Yamaguchi	.44398***	0.12	0.20	0.68	.51048***	0.13	0.26	0.77	.39992***	0.14	0.13	0.67	.47464***	0.15	0.18	0.77			
Tokushima	0.02783	0.17	-0.30	0.36	-.28165	0.18	-0.63	0.06	.04813	0.19	-0.22	0.51	-.022409	0.20	-0.61	0.16			
Kagawa	0.23978	0.16	-0.08	0.56	.26102	0.17	-0.08	0.60	.36129**	0.18	0.02	0.71	.38340***	0.19	0.01	0.76			
Ehime	.39049***	0.13	0.14	0.64	.46830***	0.13	0.21	0.73	.42778***	0.14	0.15	0.70	.50424***	0.15	0.21	0.80			
Kouchi	.97374***	0.15	0.67	1.28	.71797***	0.16	0.40	1.04	.59082***	0.18	0.24	0.94	.26499	0.19	-0.11	0.64			
Fukuoka	.88272***	0.07	0.74	1.03	.74274***	0.08	0.59	0.90	.88668***	0.08	0.73	1.05	.73775***	0.09	0.56	0.91			
Saga	.50967***	0.15	0.21	0.81	0.20783	0.16	-0.11	0.53	.50425***	0.17	0.17	0.84	0.12264	0.18	-0.23	0.48			
Nagasaki	.33523***	0.13	0.09	0.58	.25639*	0.13	0.00	0.52	.32586***	0.14	0.05	0.60	.020667	0.15	-0.09	0.50			
Kumamoto	.32318***	0.11	0.10	0.55	.20610*	0.12	-0.03	0.44	.22245*	0.13	-0.03	0.48	.06379	0.14	-0.21	0.34			
Oita	.38517***	0.13	0.13	0.64	.16504	0.14	-0.10	0.43	.25760*	0.15	-0.04	0.55	-.01021	0.16	-0.32	0.30			
Miyazaki	.56632***	0.13	0.30	0.83	.40546***	0.14	0.13	0.68	.40066***	0.15	0.10	0.70	.017665	0.16	-0.14	0.49			
Kagoshima	.62347***	0.11	0.40	0.85	.57958***	0.12	0.34	0.82	.64938***	0.13	0.40	0.90	.61084***	0.13	0.35	0.88			
Okinawa	.90891***	0.12	0.68	1.14	.89309***	0.13	0.65	1.14	.73388***	0.13	0.48	0.99	.71668***	0.14	0.44	1.00			
Year2006	.16190***	0.05	0.06	0.27	.22554***	0.06	0.11	0.34	0.0934	0.07	-0.04	0.22	.15058*	0.07	0.01	0.29			
Year2007	.41613***	0.05	0.31	0.52	.47732***	0.06	0.37	0.59	.55408***	0.06	0.43	0.68	.62055***	0.07	0.49	0.75			
Year2008	.43270***	0.05	0.33	0.53	.55559***	0.05	0.45	0.66	.54779***	0.06	0.43	0.67	.67129***	0.06	0.54	0.80			
Year2009	.55469***	0.05	0.45	0.66	.85831***	0.06	0												