The influence of advanced life support response time on patient outcomes after out-of-hospital cardiac arrest in Taipei.

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Background

- Out-of-hospital cardiac arrests (OHCAs) remain a major event which affects public health worldwide.
- Emergency medical services (EMS) response time is one of prehospital factors associated with survival rate of patients with OHCA.
- The association between OHCA patient survival and ALS response time remained undetermined.

Objective

To determine whether shorter ALS response time was associated with improved chance of survival in non-trauma adult OHCA patients.

Materials and methods

- We analyzed Utstein-based registry data on OHCA patients in Taipei from 2011 to 2015.
- The eligible patients were adult, aged ≥ 20 years, with non-traumatic OHCA who underwent resuscitation attempts participated by ALS team.
- Exclusion criteria: Patients without complete data, witnessed by emergency medical technicians, or response time ≥ 15 minutes.
- The primary outcome was survival to discharge, and the secondary outcome is the favorable neurological outcome (cerebral performance category ≤ 2).
- Subgroup analyses were based on presenting rhythms of OHCA, including shockable, pulseless electrical activity (PEA) and asystole.

	Any ALS (n=4,278)	ALS (n=546)	ALS+ALS (n=115)	ALS+BLS (n=3,617)
Patient				
Age, years (median [Q1-Q3])	78 (64, 86)	77 (65, 85)	71 (61, 82)	78 (64, 86)
Male, number (percent)	2652 (61.99%)	342 (62.64%)	80 (69.57%)	2230 (61.65%)
Witness, number (percent)	1248 (29.17%)	188 (34.43%)	50 (43.48%)	1010 (27.92%)
Bystander CPR, number (percent)	1669 (39.01%)	192 (35.16%)	28 (24.35%)	1449 (40.06%)
Shockable rhythm, number (percent)	436 (10.19%)	68 (12.45%)	20 (17.39%)	348 (9.62%)
Location of arrest, EMS time interval and treatment (median [Q1-Q3] or %)				
Public, number (percent)	326 (7.62%)	74 (13.55%)	18 (15.65%)	234 (6.47%)
Response time, minutes (median [Q1-Q3])	9 (7, 12)	6 (4, 7)	5 (4, 7)	10 (8, 12)
Scene time, minutes (median [Q1-Q3])	15 (13, 18)	15 (13, 18)	17 (15, 21)	15 (12, 17)
Medical center, number (percent)	2125 (49.67%)	294 (53.85%)	66 (57.39%)	1765 (48.8%)
Adrenaline, number (percent)	1366 (31.93%)	214 (39.19%)	66 (57.39%)	1086 (30.02%)
Atropine/amiodarone/others, number (percent)	57 (1.33%)	14 (2.56%)	3 (2.61%)	40 (1.11%)
Endotracheal tube, number (percent)	789 (18.44%)	161 (29.49%)	34 (29.57%)	594 (16.42%)
Survival status, number (percent)				
Any ROSC	1149 (26.86%)	187 (34.25%)	40 (34.78%)	922 (25.49%)
Sustained ROSC	993 (23.21%)	162 (29.67%)	37 (32.17%)	794 (21.95%)
Survival to discharge	287 (6.71%)	51 (9.34%)	18 (15.65%)	218 (6.03%)
CPC ≤ 2 at discharge	126 (2.95%)	26 (4.76%)	10 (8.7%)	90 (2.49%)

Table1. Demographic data and outcomes of enrolled out-of-hospital cardiac arrest patients stratified based on dispatch group

Result

- A total of 4,278 cases were included in final analysis. The median ALS response time was 9 minutes (interquartile range 7 to 12).
- Every minute delay of any ALS response time would reduce 7% chance of survival to discharge (adjusted odds ratio [aOR] 0.93; 95% confidence interval [CI]: 0.90-0.97) as well as favorable neurological outcome (aOR 0.91; 95%CI: 0.86-0.97).
- Subgroup analysis showed the longer ALS response time was negatively associated with the chances of survival to discharge among OHCA patients with shockable rhythm (aOR 0.89; 95%CI: 0.83-0.95) and PEA group (aOR 0.92; 95%CI: 0.86-0.99).

Conclusion

In non-trauma adult OHCA in Taipei, the longer ALS response time was associated with the worse odds of survival to discharge and favorable neurologic outcome, especially in patients with presenting shockable rhythm and PEA group.

	Any ALS OR(CI), n	ALS OR(CI), n	ALS+ALS OR(CI), n	ALS+BLS OR(CI), n
Survival to discharge				
Shockable +non-shockable	0.93 4,278 (0.90, 0.97)	0.94 546 (0.81, 1.09)	0.98 115 (0.71, 1.35)	0.94 3,617 (0.90, 0.98)
pVT/Vf	0.89 436 (0.83, 0.95)	0.77 68 (0.55, 1.08)	NA 20	0.89 348 (0.83, 0.96)
Non-shockable rhythm	0.95 3,842 (0.91, 1.002)	0.96 478 (0.80, 1.15)	1.02 95 (0.71, 1.49)	0.97 3,269 (0.92, 1.02)
PEA	0.92 800 (0.86, 0.99)	0.81 126 (0.59, 1.11)	NA 28	0.93 646 (0.85, 1.01)
Asystole	0.99 3,018 (0.93, 1.06)	1.09 348 (0.87, 1.37)	NA 67	1.01 2,603 (0.95, 1.08)
CPC 1 or 2				
All	0.91 4,278 (0.86, 0.97)	0.81 546 (0.62, 1.05)	1.19 115 (0.72, 1.97)	0.93 3,617 (0.87, 0.99)
pVT/Vf	0.88 436 (0.81, 0.95)	0.82 68 (0.6, 1.13)	NA 20	0.90 348 (0.81, 0.99)
Non-shockable rhythm	0.95 3,842 (0.87, 1.04)	0.71 478 (0.41, 1.21)	2.01 95 (0.56, 7.27)	0.96 3,269 (0.87, 1.07)
PEA	0.90 800 (0.80, 1.01)	0.69 126 (0.38, 1.26)	NA 28	0.89 646 (0.78, 1.03)
Asystole	1.07 3,018 (0.94, 1.20)	NA** 348	NA** 67	1.05 2,603 (0.92, 1.19)

Table 2. Logistic regression analysis

Fig1. Spline curves for the outcomes of survival to discharge at hospital discharge (with 95% confidence intervals)