Emergency response management and outcomes of out-of-hospital sudden cardiac arrest patients at exercise and sport facilities in Queensland, Australia

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Aim: In the event of an out-of-hospital sudden cardiac arrest (OHSCA) timely cardiopulmonary resuscitation (CPR) and utilisation of an automated external defibrillator (AED) are crucial to increase the chances of survival. This study aims to analyse the emergency response management and outcomes of OHSCA patients at exercise and sport facilities (ESF) in Queensland, Australia.

Methods: The de-identified electronic OHSCA data was obtained from the Queensland Ambulance Services (QAS) for the eight year period between 2007 and 2015. The data was systematically extracted, coded and categorised before analysing using descriptive, correlational and logistic regression models in SPSS version 24. Potential cases with ambiguous case descriptions as to the type of location were manually reviewed by street address for relevance. This study was approved by the Central Queensland University Human Research Ethics Committee (Approval Number: H15/06-138).

Results: There were 250 OHSCA cases at ESF after exclusions (e.g. vehicle trauma, home, <18 years old) and key word search by type of sports. The OHSCA patients had a mean age of 59.39 (95% CI: 57.36, 61.43, range:74) and were mostly male (n=187, 86.6%) (Table 1). The average time it took for the paramedics to arrive on scene was 8.74 minutes (95% CI: 7.85, 9.62, range=48) with no significant difference across geographic locations (p<.05). Following paramedic’s arrival and treatment, 38.8% (n=97) of the OHSCA patients improved, while 32.4% (n=81) died mostly on the scene (25.2%, n=63).

On-arrival, 75.6% (n=189) of the OHSCA patients were being applied CPR that showed 6.8% more improvement of the patients compared to no CPR or AED by the bystanders (Figure 1). Only at 12.4% (n=31) of the ESF both CPR and AED were applied by the bystanders that was associated with 4% less deaths than CPR only. However, the logistic regression model showed that effective CPR was 1.9 times a better predictor for improved OHSCA patient outcomes (Table 2).

Table 1. Characteristics of OHSCA cases at ESF.

	n	%
Gender		
Female	32	12.8
Male	218	87.2
Age category		
18-24	4	4
25-34	10	8.8
35-44	22	16
45-54	40	19.6
55-64	49	36.4
65 and over	91	86.4
Risk factors		
Obesity	14	5.6
Diabetes	3	1.2
Hypertension	10	4
Hyper-cholesterol	2	.8
Season		
Autumn	75	30
Spring	47	18.4
Summer	58	23.2
Winter	69	27.6
Geographic location		
Metropolitan cities	139	55.6
Inner regional	73	29.2
Outer regional	38	15.2

Figure 1. On arrival OHSCA patient management at ESF.

Table 2. Results of logistic regression for improved OHSCA patient outcomes at ESF.

Variables	B - Coefficient	Odds Ratio	95% CI	p
On arrival CPR	-.038	.963*	.474, 1.953	.916
On arrival effective CPR	.619	1.857**	1.000, 3.447	.05*
On arrival AED	-.737	.479	.200, 1.143	.097
Gender (Female)	.923	2.517*	1.122, 5.644	.025*
Arrival time	-.103	.902*	.848, .958	.001*
Nagelkerke R square	.149			
Chi-square	29.152 (5, n = 250), p<.001			

Conclusions: These findings show that emergency management of cardiac events at ESF in Queensland are suboptimal. This study has implications for ESF operators to revise their risk management programs including medical emergency plans and procedures, and ensure they have staff currently trained in CPR and use of an AED to be capable of properly responding to an unexpected SCA event.