



Published secondary study:

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Dr Chih-Hao Lin

PAROS Group



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ORIGINAL ARTICLE

Variation of current protocols for managing out-of-hospital cardiac arrest in prehospital settings among Asian countries

Chih-Hao Lin ^{a,*}, Yih Yng Ng ^b, Wen-Chu Chiang ^c,
Sarah Abdul Karim ^d, Sang Do Shin ^e, Hideharu Tanaka ^f,
Tatsuya Nishiuchi ^g, Kentaro Kajino ^h, Nalinas Khunkhlai ⁱ,
Matthew Huei-Ming Ma ^c, Marcus Eng Hock Ong ^j

Department of Emergency Medicine,
National Cheng Kung University Hospital,
College of Medicine, National Cheng Kung University,
Tainan, Taiwan

Table 1 Characteristics of emergency medical services systems in the year 2011.

EMS unit (city-based)	Bangkok	Kuala Lumpur	Osaka	Tokyo	Seoul	Singapore	Tainan	Taipei
Country	Thailand	Malaysia	Japan	Japan	Korea	Singapore	Taiwan	Taiwan
Urbanization	Urban	Urban	Urban plus suburban	Urban plus suburban	Urban	Urban	Urban plus rural	Urban
Population (millions)	10.1	1.6	2.7	13	10.4	5.3	1.9	2.7
Territory (km ²)	1568	243	223	2187	605	710	2191	272
Population density (1000/km ²)	6.4	6.7	12	5.9	17.3	7.5	0.9	9.8
EMS response time, min (mean ± SD)	13.5 ± 6.6	24.0 ± 11.0	7.4 ^a	7.2 ± 3.2	5.7 ± 3.5	8.2 ± 3.7	6.0 ± 7.7	6.4 ± 3.3
EMS transport time min (mean ± SD)	12.5 ± 8.3	NA	28.6 ^a	20.4 ± 7.8	7.4 ± 4.8	16.4 ± 24.0	9.0 ± 6.8	4.5 ± 2.8
No. of patients assessed by EMS per y	36,362	17,581	214,953	640,193	295,699	142,549	72,010	98,300
No. of OHCA assessed by EMS per y	NA	1084	1600 ^b	12,851	4179	1761	1468	3072
Highest service level	Physician	Physician assistant or nurse	EMT-intermediate	EMT-intermediate	EMT-intermediate	EMT-intermediate	EMT-paramedic	EMT-paramedic
Operation of ambulance	Hospital	Mixture of hospital-based, civil defense, & nonprofit organizations	Fire department	Fire department	Fire department	Fire department	Fire department	Fire department
Finance	Free, & reimbursed by public insurance	Free & tax based	Free & tax based	Free & tax based	Free & tax based	Free & tax based	Free & tax based	Free & tax based
Tiered response	BLS plus ALS	BLS or ALS single	BLS single	BLS single	BLS single	BLS single	BLS plus ALS	BLS plus ALS

ALS = advanced life support; BLS = basic life support; EMS = emergency medical service; EMT = emergency medical technician; NA = not available; No. = number; OHCA = out-of-hospital cardiac arrest; SD = standard deviation.

^a SD is not available.

^b Only witnessed-OHCA.

Table 2 Protocols for managing patients with out-of-hospital cardiac arrest in the prehospital settings.

EMS unit (city-based)	Bangkok	Kuala Lumpur	Osaka	Tokyo	Seoul	Singapore	Tainan	Taipei
Valid DNR order in the hospital setting	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Valid DNR order in the prehospital setting	No	Yes	No	No	Yes	Yes	Yes	Yes
CPR is exempted if obvious signs of death are presented ^a	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Protocols for nontraumatic OHCA	Performing CPR on scene for 2 min along with AED use & then transport to the hospital with ongoing CPR in the ambulance	Performing CPR on scene for 15 min along with AED use & then transport to the hospitals if ROSC or defibrillation	Performing CPR on scene for 4 min along with AED use & then transport to the nearest hospitals with ongoing CPR in the ambulance	Performing CPR on scene for 4 min along with AED use & then transport to the nearest hospitals with ongoing CPR in the ambulance	Performing CPR on scene for varying duration ^b along with AED use & then transport to the nearest hospitals with ongoing CPR in the ambulance	Performing CPR on scene for 2 min along with AED use & then transport to the nearest hospitals with ongoing CPR in the ambulance	Performing CPR on scene for 4 min along with AED use & then transport to the nearest hospitals with ongoing CPR in the ambulance	Performing CPR on scene for 2 min along with AED use & then transport to the nearest hospitals with ongoing CPR in the ambulance
Protocols for traumatic OHCA	Performing CPR on scene for 2 min without AED use & then transport to the nearest hospitals with ongoing CPR in the ambulance	No CPR	Performing CPR on scene for 4 min without AED use & then transport to the nearest hospitals with ongoing CPR in the ambulance	Performing CPR on scene for 4 min without AED use & then transport to the nearest hospitals with ongoing CPR in the ambulance	Performing CPR on scene for 4 min without AED use & then transport to the nearest hospitals with ongoing CPR in the ambulance	Performing CPR on scene for 2 min without AED use & then transport to the nearest hospitals with ongoing CPR in the ambulance	Performing CPR on scene for 4 min along with optional AED use & then transport to the nearest hospitals with ongoing CPR in the ambulance	Performing CPR on scene for 2 min along with AED use & then transport to the nearest hospitals with ongoing CPR in the ambulance
Application of TOR rules in nontraumatic OHCA	No ^c	Yes ^d	No	No	No	No	No	No
Application of TOR rules in traumatic OHCA	No ^c	Yes ^d	No	No	No	No	No	No

Table 3 Considerations regarding field termination of resuscitation.

EMS unit (city-based)	Bangkok	Kuala Lumpur	Osaka	Tokyo	Seoul	Singapore	Tainan	Taipei
Medical evidence	Lack of validation of TOR rules in Asian EMS systems	Medical evidence is not strong enough	Unmentioned	Unmentioned	Using shortterm outcomes like survival to discharge may overestimate TOR adequateness; longer follow up for neurologic performance may be needed to generate proper TOR guidelines	Unmentioned	Unmentioned	Lack of validation of TOR in Asia EMS system. New interventions (such as ECMO, hypothermia therapy, or mechanical CPR devices) may improve outcome.
Medical oversight	Unmentioned	Absence of national consensus on TOR for BLS providers	Unmentioned	Lack of medical direction committee	Ambiguousness of EMS protocols for patients with OHCA	Unmentioned	Unmentioned	Unmentioned
EMS characteristics	Unmentioned	System is maintained by hospital-based providers with proper organizational structure, oversight & protocol. System also has another nonhospital based provider that is mainly focused on providing first responder service with minimal organizational medical oversight	Unmentioned	Unmentioned	Advanced medical care in hospitals at the early postarrest phase may be beneficial for patients with OHCA because the EMS transport time is relatively short	Unmentioned	Unmentioned	EMS transport time in Asia EMS system is relatively short
EMS manpower	Unmentioned	Lack of ambulance & manpower, may delay response time	Unmentioned	Unmentioned	Not enough EMT to perform ALS- TOR	Not enough EMT to perform ALS- TOR	Unmentioned	Unmentioned
EMT education	Unmentioned	Absence of standardization on	Unmentioned	Unmentioned	Unmentioned	EMT education consistency in	Unmentioned	Unmentioned

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Table 3 (continued)

EMS unit (city-based)	Bangkok	Kuala Lumpur	Osaka	Tokyo	Seoul	Singapore	Tainan	Taipei
Legal consideration	Authorities unaware of the importance of TOR	the education requirements for EMS providers Unmentioned	Lack of national consensus & legislation for TOR rules	Lack of legislation for TOR rules	Unmentioned	applying protocols by EMTs Unmentioned	Unmentioned	Unmentioned
Public perception	Unmentioned	Local social norms are acceptable; should be adhered to local practice	Public unawareness of pre-existing DNR orders	Public concerns of making rules for terminal care is generally high	Unmentioned	Family acceptance of field TOR is generally low	Public perception is overoptimistic for outcomes of patients with OHCA; lack of confidence in EMT expertise. Family may overrule existing DNR orders	Unmentioned
Cost-effectiveness analysis	Lack of cost-effectiveness analysis	Unmentioned	Unmentioned	Unmentioned	Unmentioned	Unmentioned	EMS is free of charge & financial burden of post-resuscitation care is relatively low	Unmentioned

ALS = advanced life support; BLS = basic life support; DNR = do-not-resuscitate; ECMO = extracorporeal membrane oxygenation; EMS = emergency medical service; EMT = emergency medical technician; OHCA = out-of-hospital cardiac arrest; TOR = termination of resuscitation.

International variations
in practices and policies
related to OHCAs
do exist.

Dr Yih Yng Ng