

# Prehospital Emergency Care in Singapore

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Partners in Academic Medicine



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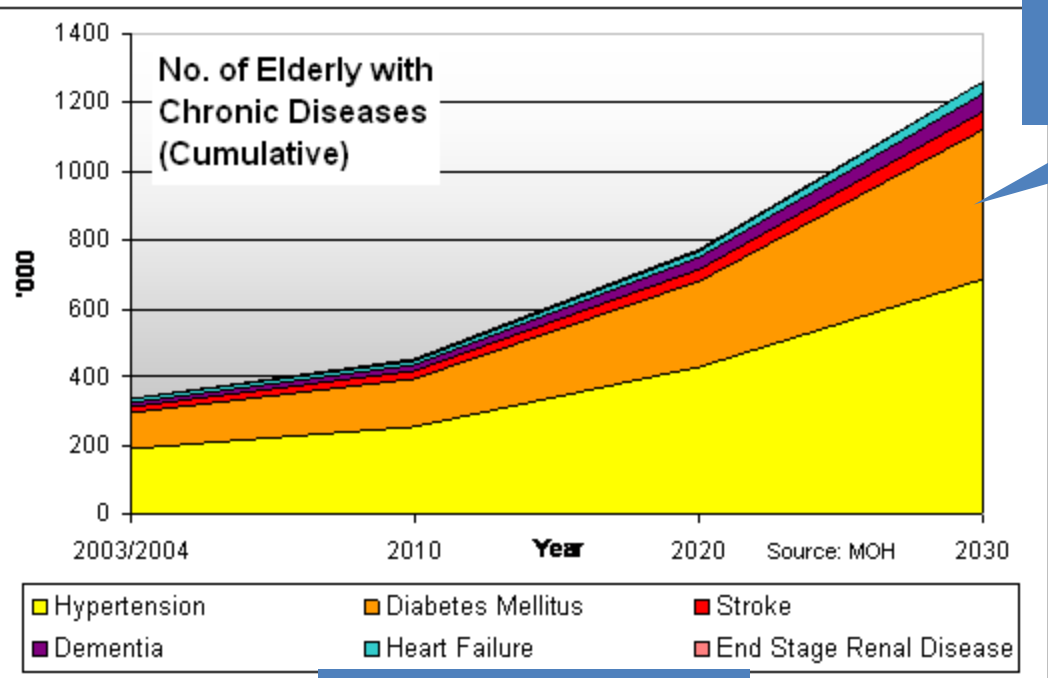


Together We Care. 一起我们  
Bright Vision  
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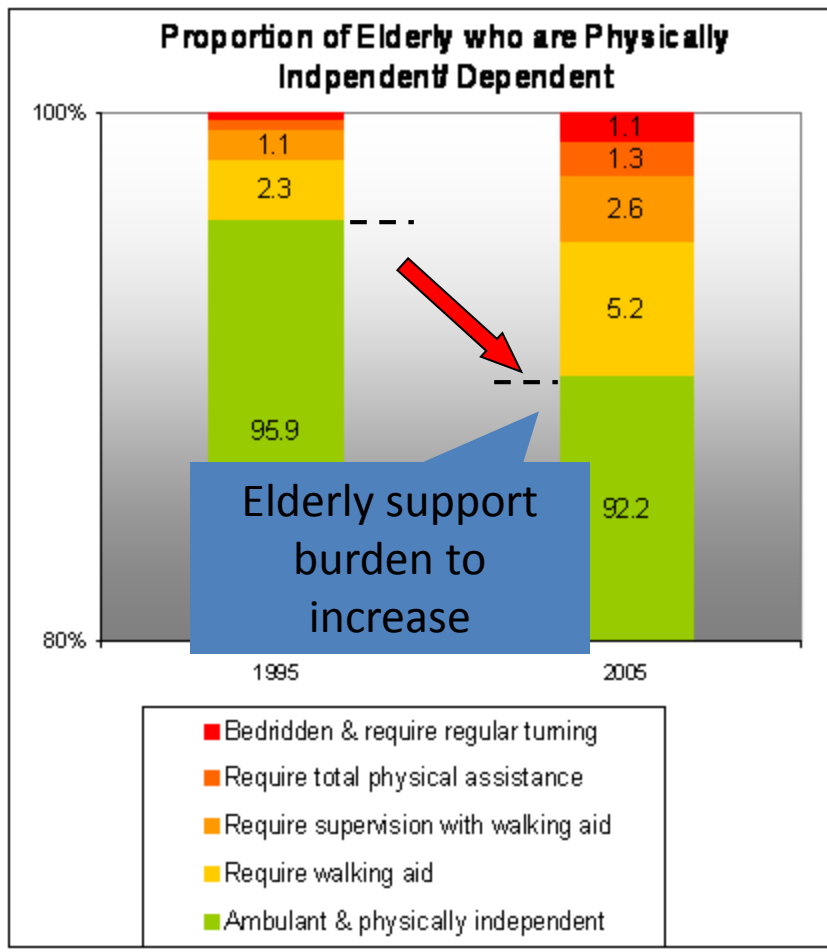
# Singapore: Then and Now



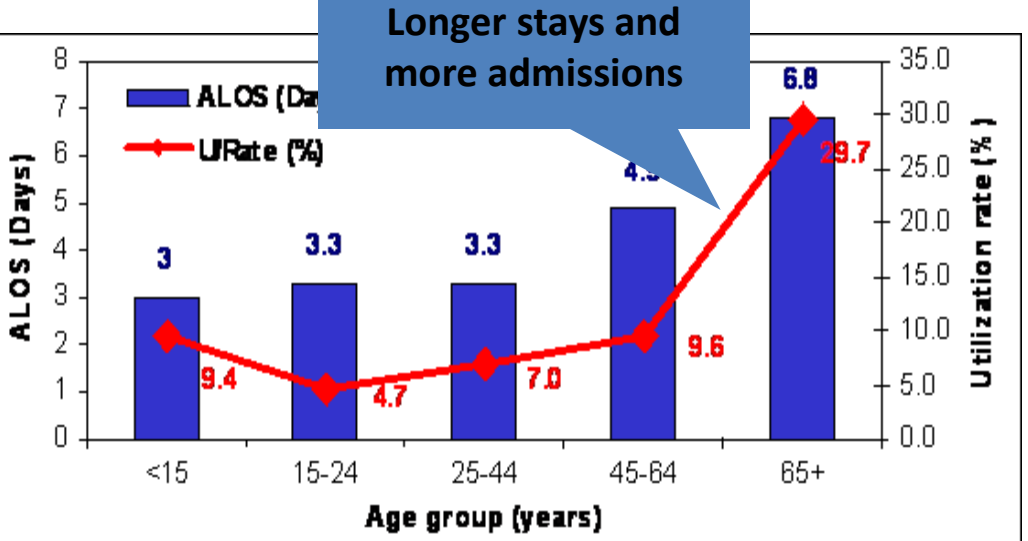
# We face multiple challenges in Healthcare



Chronic disease burden increasing



Elderly support burden to increase







# Overview

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## □ Vision

- For Singapore to possess a **world-class** Pre-hospital Emergency Care (PEC) system, **readily accessible** to all, and providing **excellent patient outcomes**.



# Principles of Transformation

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## □ Values

- Its promotion is a multi-agency, multi-sectoral, long term effort.
- Evidence-based and cost-effective.
- Requires broad public education and involvement
- Training and empowerment of PEC providers to act in emergencies.

# Understanding the “Chain of Survival”

## Using the Chain of Survival

Rapid recognition and activation of EMS via 9-1-1.



9-1-1



CPR

CPR started quickly.

Early use of automated external defibrillator (AED).



AED



Rapid delivery of advanced life support.

EMS

Early post-resuscitative care.



CARE

**What can we attribute variation in survival to?**

**Disparate outcomes are almost certainly due to  
timeliness and quality of treatment**



# Leadership and Oversight



## **Leadership**

- Joint Steering Committee at Ministry level (MOH & MHA)
- Medical Advisory Committee (MAC)
- National Therapeutic Temperature Management (Hypothermia) Workgroup

## **Medical Oversight**

- Trained ED physicians provides support and medical inputs
  - Tactical Emergency Training
  - Training for Fire bikers
- 24/7 medical oversight by ED physicians (target Apr 2015)

## **Operations Support**





- Support PEC sub-committees

## **Medical Dispatch**

- Secondment of four nurse dispatchers to SCDF call centre
- In house training for SCDF's dispatchers
- Dispatcher QI
- Provides tele-CPR and tele-AED (FY15)
- Improvement of dispatch protocol



# Multi-Agencies

<b>Ministry of Home Affairs</b> 	<b>Ministry of Health</b> 	<b>Ministry of Education</b> 	<b>Ministry of Defence</b> 
<b>SCDF CDA &amp; PAD</b>	<b>Hospitals ED, UPEC, NRC, NFAC, IAN</b>	<b>NYP and ITE</b>	<b>SAF, SMTI and Medical Centres</b>
<ul style="list-style-type: none"> <li>• Provision of EMS</li> <li>• Training and continuous education for Paramedics and EMTs</li> <li>• Community training</li> </ul>	<ul style="list-style-type: none"> <li>• Medical oversight</li> <li>• Oversight of ambulances &amp; MTS</li> <li>• Accreditation of PEC professionals</li> <li>• Coordinating agency (UPEC)</li> <li>• EMT training</li> </ul>	<ul style="list-style-type: none"> <li>• Academic training for Paramedics</li> <li>• Continuing education for prehospital care professionals</li> </ul>	<ul style="list-style-type: none"> <li>• Primary training site for EMTs and Paramedics vocational training</li> <li>• Largest employer of Paramedics and EMTs</li> </ul>



# Professional Standards

## Ambulance Standards

- Established for Ambulance and Medical Transport Service (non-emergency)
- MOH's involvement, ultimately legislation in 2017

## Audit

- Trauma audit
- Clinical audit (paper)
- SCDF operational audit

## Protocol Development

- AMD Protocol
- Anaphylaxis Protocol
- Mental Patient Protocol
- Cardiac Arrest Protocol
- Updating of trauma protocol
- Tourniquet protocol
- CPAP on ambulance
- STEMI diversion

## New

- Establish scope of practice for
  - Medical Transporter (driver), EMT, Paramedic and Adv. Paramedic
- Explore new equipment
  - Ferno Femur Traction
  - Pelvic Binders
- Tiered Response (via Fire Bikes, Red Rhino, Fire Engine, Ambulance)



# Community Responsiveness

## DARE Project

- Dispatcher Assisted Responder (DARE) programme – video based training
- Pilot (FY14 to FY15)
  - Schools
  - People's Association
  - Workplaces
  - Religious Organisations
- Target as standard PE curriculum in MOE schools from 2016

## PADP

- Existing: Sports facilities, Shopping Malls, Bus terminals, Airport etc.
- Recent tenders: SAF Camps, Community Centres, MHA facilities and MOE schools
- Next phase : GP clinics, Resident Committee Centres, Senior Day Care Centres, Nursing Homes

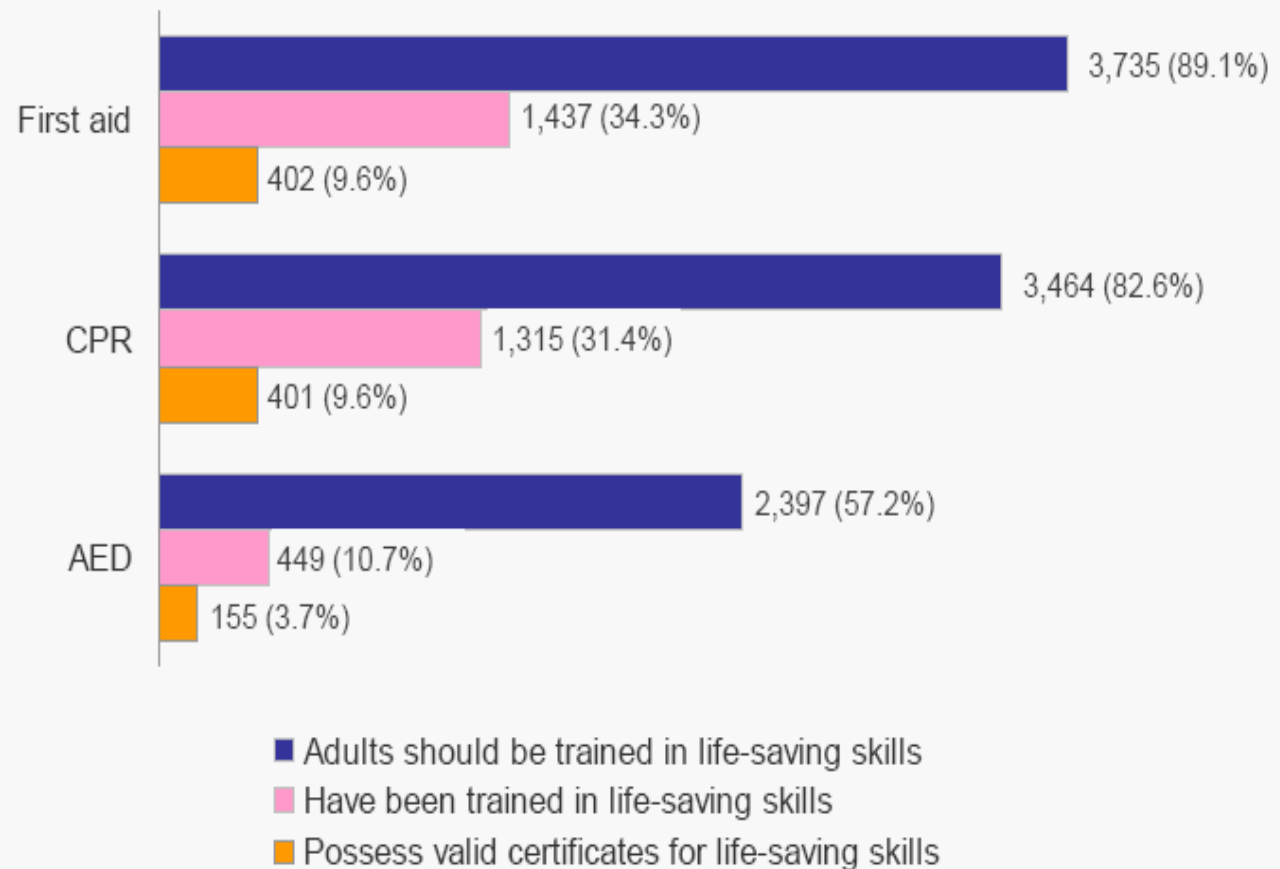
## Community Engagement

- AED Registry (R-AEDi) – SCDF + SHF
- First Responder mobile App – dispatch first responders by SCDF ops centre

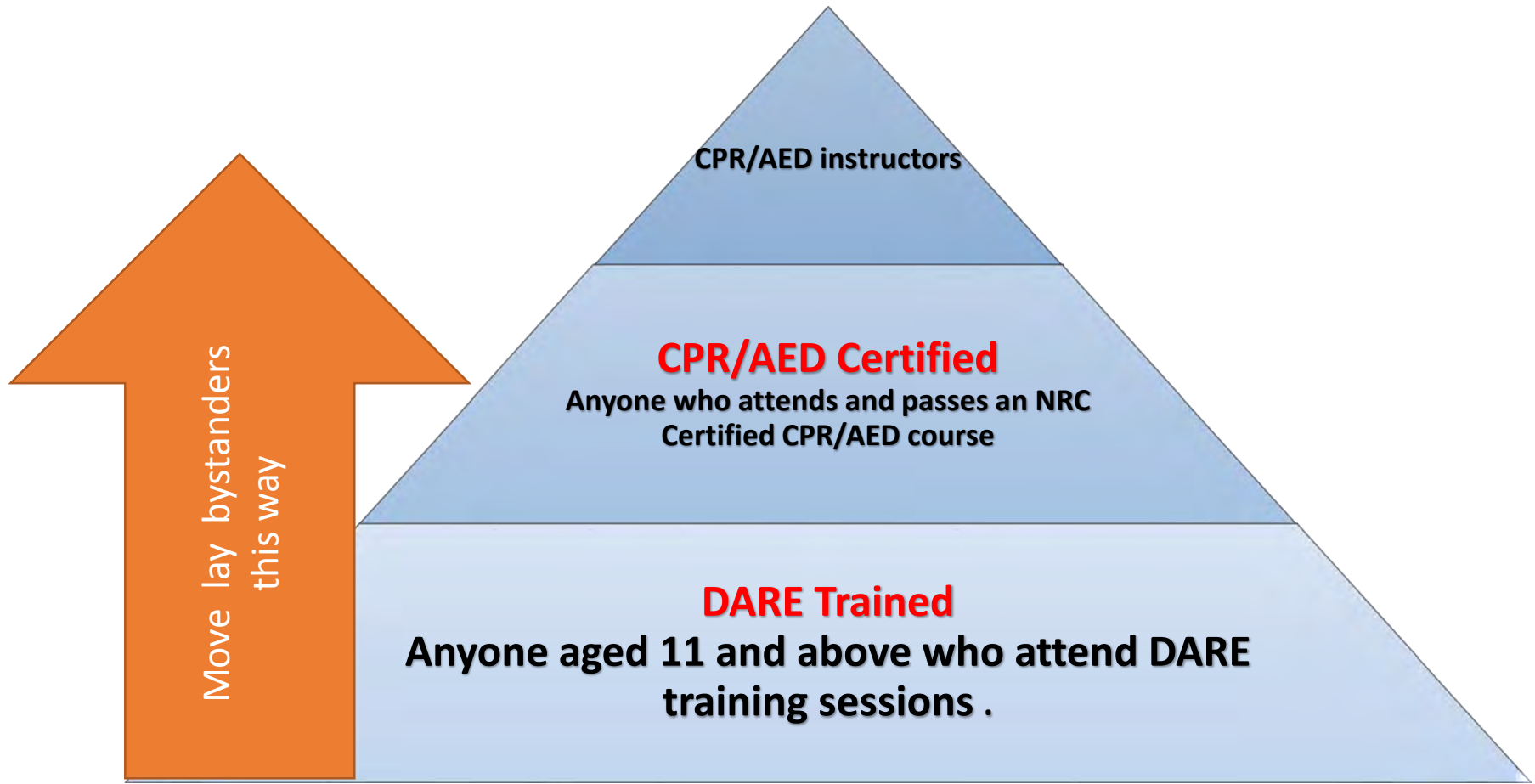
## Others

- PEC publicity campaign and cinema advertisements (early 2015)

Figure 1 – Respondents' belief about First Aid, CPR & AED training; whether they have ever been trained; whether they possess valid certification.



# Pyramid of First Responder Preparedness



DARE Aware: Everyone becomes aware of what we teach in DARE through social media, traditional media, or by word of mouth.



Health Minister Gan Kim Yong (left) and Reverend Derrick Lau at a simplified CPR training session of the Incarnation. The training is being extended to religious organisations and workplaces. ST

# Big push to get more people trained in CPR

## Goal: At least one person in every home trained in simplified technique

By SAMANTHA BOH

A BIG push is being made to get at least one person in every household trained in a simplified cardiopulmonary resuscitation (CPR) procedure.

The Unit for Pre-Hospital Emergency Care (Upec) has given itself five years to do it, said its medical director Marcus Ong.

The plan is to extend the Dispatcher Assisted first Responder, or Dare, programme to religious organisations and workplaces, he said. Till now, the year-old programme has been making the

willing and able to respond in an emergency," he said.

Around 1,800 cardiac arrests occur in Singapore every year, but only 3 per cent of the victims survive them.

The Dare programme can be learnt in an hour and participants are taught CPR in simple, easy-to-follow steps: dial 995, stay on the line with a medical dispatcher, and perform CPR using an automated external defibrillator.

Dare focuses on chest compressions, which have been found to be more crucial than

Yesterday, members of the Methodist Church of the Incarnation in Choa Chu Kang became the first among religious groups to be trained.

Sixty church-goers were given a quick session after their morning church service.

Health Minister Gan Kim Yong, who was guest of honour, however, encouraged participants to learn the standard CPR, which included mouth-to-mouth ventilation.

He added that it was the preferred method for cardiac arrest in children and in drowning cases.

He also noted that most out-of-hospital cardiac arrests happen in the victim's home or places he frequents, often in the presence of relatives, friends or neighbours.

"(So) by preparing for the unexpected, the skills acquired today end up saving lives of someone we know or someone we love in the future if we dare to step

" he said.

## CPR helpline a real life-saver

By KASH CHEONG

**M**ORE people are surviving cardiac arrests in Singapore – and it's not just down to doctors.

Friends, loved ones and even strangers are increasingly performing cardiopulmonary resuscitation (CPR) on cardiac arrest victims.

The emergency procedure involves chest compressions and giving a "kiss of life", which can be crucial in saving a victim.

Four years ago, only two out of 10 cardiac arrest patients received CPR from a bystander. But this number has doubled, largely thanks to a phone service which lets 995 callers get step-by-step CPR instructions from health-care staff until an ambulance arrives.

It was launched in 2012 by the Ministry of Health's Unit for Pre-Hospital Emergency Care, the Singapore General Hospital (SGH) and the Singapore Civil Defence Force.

Survival rates have also increased from 3.6 per cent to 4.6 per cent over the last four years, which is "good progress", according to Marcus Ong, senior consultant at SGH's department of emergency medicine.

After a person collapses, his chances of surviving falls by 10 per cent every minute.

In Singapore, it takes an average of 10 minutes for an ambulance to arrive and 46 minutes before the patient gets to hospital. Paramedics may perform additional treatment along the way.

"If you are relying on paramedics or hospital doctors to save a cardiac arrest patient, it might be too late. Bystander CPR really gives the patient a fighting chance," said Associate Professor Ong.

He was speaking on Wednesday at SGH's Survivor Awards event, which honours cardiac arrest patients and their life-savers.

However, Dr Ong believes more can be done to increase survival rates for a condition which affects 1,800 people here every year.

"In places like Seattle, Washington, survival rates are about 20 per cent," he added. "Most strangers would perform CPR on others and kids learn how to do it in school."

He attributed the higher survival rates there to good school and community outreach, which have been ongoing for 60 years.

In Singapore, the People's Association and the National Resuscitation Council are training the public and grassroots leaders, while schools like Victoria Junior College also teach the life-saving procedure.

By 2020, Dr Ong aims to have someone trained in CPR in every household. However, there are barriers to this – such as people being deterred by having to resuscitate someone they have never met.

Pointing out that eight out of 10 cardiac arrest cases happen at



LUCKY: Ms Tan called 995 when she saw her mother's eyes roll up and tongue hang out last year. A calm voice talked her through the CPR process. Madam Lee survived and it prompted her husband, Mr Tan, to sign up for a CPR course. PHOTO: THE STRAITS TIMES

home, he added: "If it's a stranger on the street, people think, 'Why should I bother?' But, if you learn CPR, more often than not, you might end up saving a loved one."

Nurse Amanda Tan did just that. When the 31-year-old saw her mother's eyes roll up and tongue hang out last year, she panicked and called 995. A calm voice over the phone talked her through the process.

"Even though I had learnt CPR, at that moment, I was in a daze," she said. "It really helps you compose your thoughts and remember what to do."

Her mother, Lee Mary Ann, survived the ordeal. It prompted her father, Eric Tan, to sign up for a CPR course. "My mother said she was lucky to survive," said Ms Tan. "But we are even luckier to have her back."

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# AED Installation by SCDF

- SCDF installing 385 AEDs near lifts
- Trainees will be informed of the nearest unit



# Strategic Imperatives

World-class standards for EAS and non-emergency patient transport (NEPT) services

Appropriate use of 'Lights and Sirens'

Monitoring and data collection system to assess patient outcomes for PEC

Ambulance  
Responsiveness

Enhance medical prioritisation and emergency medical dispatch (EMD) system

Standardised ambulance treatment protocols

Optimal numbers and deployment of ambulances

Reduce response times through flexible ambulance deployment systems.



# Emergency Medical Dispatch

- Caller ID
- Automatic location tracing (address database)
- Computer assisted dispatch and ambulance monitoring
- GPS navigation and location tracking
- Emergency Medical Dispatchers



# IMPROVED RESPONSE TIMES WITH MOTORCYCLE BASED FAST RESPONSE PARAMEDICS IN AN URBAN SETTINGS

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## introduction

Pre-hospital response intervals are known to be an important factor in the level of care provided by any Emergency Medical System.

In big cities, response intervals are known



## aims/objectives

To see if response intervals can be improved with motorcycle based Fast Response Paramedics (FRP) compared with standard ambulances in an urban setting.

## methods

A prospective, observational study. Simultaneous dispatch of motorcycles based FRP's equipped with Automated External Defibrillators and standard ambulances for cardiac arrest, cardiac, respiratory conditions and road traffic accidents.



## results

48 consecutive ambulance runs were recorded.

Locations involved: home (41.7%), work (29.2%), road accident (20.8%) and others (8.3%)

Ambulances took on average 4.96 minutes longer than motorcycles to respond ( $p < 0.001$ , 95% CI 2.61 to 7.31). Adjusting (via multiple regression) for the day of the week, location, station, traffic and case, ambulances took on the average 4.71 ( $p < 0.001$ , 95% CI 2.45 to 6.98) minutes longer to respond.

Improvements in response times were greater when overall response times were longer (weekdays, residential/office location, moderate or heavy traffic).

		Ambulance	FRP	Difference in response time	p-value*
Time of week					
Week-day (n = 21)	Mean ± sd	10.3 ± 5.4	5.7 ± 2.0	5.1	p < 0.001
	Range	4.0 – 27.0	3 – 11		
	Median	10.0	6.0	4.0	
Weekend (n = 3)	Mean ± sd	3.0 ± 5.3	4.0 ± 1.0	4.0	p = 0.2
	Range	4.0 – 14.0	3.0 – 5.0		
	Median	6.0	4.0	2.0	
Station					
Same (n = 20)	Mean ± sd	10.0 ± 5.8	5.6 ± 2.1	4.4	p = 0.001
	Range	4.0 – 27.0	3.0 – 11.0		
	Median	8.5	5.0	3.5	
Different (n = 4)	Mean ± sd	12.9 ± 1.7	5.0 ± 1.2	7.9	p = 0.029
	Range	10.0 – 14.0	4.0 – 6.0		
	Median	13.0	5.0	8.0	
Location of call					
Home/work (n = 7)	Mean ± sd	7.3 ± 3.5	5.0 ± 1.5	2.3	p = 0.259
	Range	4.0 – 14.0	3.0 – 7.0		
	Median	6.0	5.0	1.0	
Road/other (n = 17)	Mean ± sd	11.7 ± 5.5	5.6 ± 2.2	6.1	p < 0.001
	Range	4.0 – 27.0	3.0 – 11.0		
	Median	11.0	5.0	6.0	
Traffic conditions					
Light (n = 3)	Mean ± sd	7.0 ± 4.2	6.0 ± 3.6	1.0	p = 0.8
	Range	4.0 – 10.0	3.0 – 10.0		
	Median	7.0	5.0	2.0	
Moderate (n = 19)	Mean ± sd	10.5 ± 5.8	5.2 ± 1.8	5.3	p < 0.001
	Range	4.0 – 27.0	3.0 – 11.0		
	Median	9.0	5.0	4.0	
Heavy (n = 2)	Mean ± sd	12.0 ± 2.6	7.0 ± 0.0	5.0	p = 0.2
	Range	9.0 – 14.0	7.0 – 7.0		
	Median	13.0	7.0	6.0	

\* : Mann Whitney U test

## conclusions

Use of motorcycle based paramedics allow for faster response intervals and earlier interventions, especially early defibrillation in cardiac arrest. Larger follow-up studies are planned to assess the impact of implementation of more FRP's on mortality and morbidity.

# Strategic Imperatives

Review ED service gaps with focus on 3 aspects:

- Infrastructure and ED competencies
- Levels of Service

- Specific capabilities for managing key diseases (e.g.AMI, Stroke, Trauma)

Emergency  
Department  
Responsiveness

Ensure a seamless integration of PEC services into ED services

Optimise ambulance catchment zone distribution amongst the EDs

# Strategic Imperatives

Coordination of  
paramedic development

Local system of training  
in PEC for Emergency  
physicians

Professional recognition  
of paramedics

Skills  
Development

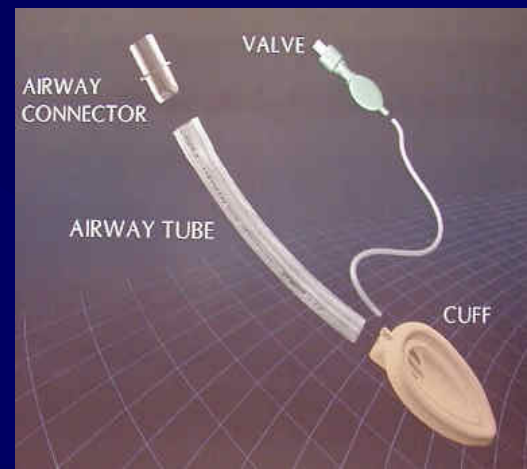
Strengthen the training  
system and enhance  
professionalism of the  
paramedics

Strengthen career  
advancement options for  
paramedics

Review training for  
emergency medical  
dispatchers

# Early basic and advanced care

- Oxygen
- Airway adjuncts
- Immobilise fractures and spinal injuries
- IV fluids
- Tamponade bleeding
- Laryngeal mask airway
- Asprin (Oral)
- Salbutamol
- Dextrose
- GTN
- Adrenaline (intravenous)
- Oxytocin
- Diazepam for seizures
- Enthanox/Penthrox/Tramadol
- Intraosseous



# PEC Techonlogy



## PEC Pilot Initiatives



## Purpose of the Pilot

- Assess the impact of proposed solution capabilities on PEC
- Demonstrate benefits of seamless data integration and situational awareness across PEC
- Test the speed and ease of implementation (time, resources, cost)
- Test robustness of the technologies and integration capabilities for seamless operations

# myResponder app

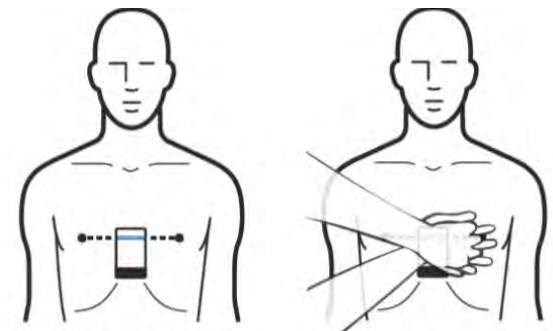
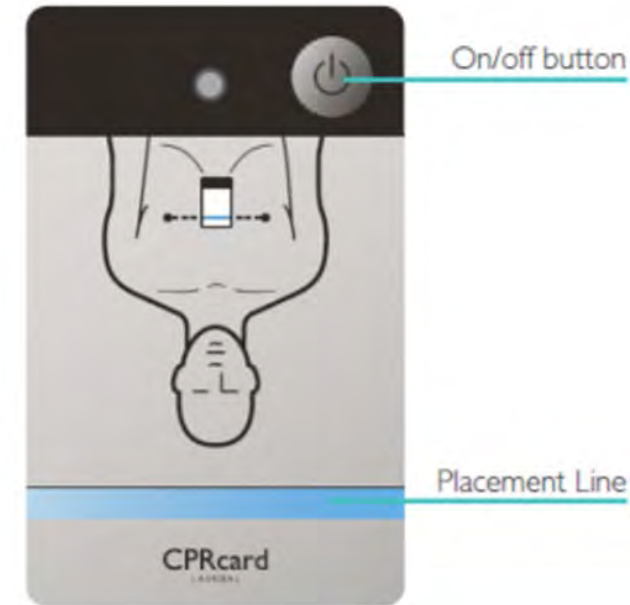


- The app is the public interface of the R-AEDi project
- R-AEDi is a joint SCDF-SHF initiative to:
  - register and geo-locate all public AEDs
  - develop a registry of volunteer 1<sup>st</sup> responders
- It will work in parallel with our study



# The CPRcard™

- Personal credit card size device
- Assists with land-marking
- Provides visual rate and depth range of compressions
- Collects data re: quality of chest compressions





# Improved OHCA survival over 10 years

	2001-2004 n=2428	2010-2012 n=3026	Adjusted OR* (95% CI)
<b><i>Survival - All Arrests</i></b>			
Discharged alive or Alive at 30 days	38 (1.6%)	97 (3.3%)	2.2 (1.5 - 3.3)
Good neurological function	28 (1.2%)	53 (1.8%)	1.7 (1.1 - 2.8)
<b><i>Survival - Utstein Style</i></b>			
Discharged alive or Remain alive at 30 days	7/280 (2.5%)	35/317 (11.0%)	9.6 (2.2 – 41.9)
Good neurological function	6/280 (2.1%)	22/317 (7.0%)	6.0 (1.3 – 27.0)

\*adjusted for age, gender, and history of heart disease

Choong CV, Lai H, Fook-Chong, Goh ES, Leong BSL, Gan HN, Foo DCG, Tham LP, Rabind C, Ong MEH. Improvements In Survival For Out-of-hospital Cardiac Arrests In Singapore Over 10 Years. Singapore Cardiac Society Annual Meeting 2013, Singapore. 3rd Prize for Oral Presentation

# What would it take to improve EMS in Asia?

## Champions and Advocates for EMS!

