Prehospital Emergency Care in Singapore

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Singapore: Then and Now
We face multiple challenges in Healthcare

Chronic disease burden increasing

Longer stays and more admissions

Elderly support burden to increase
Strategies to Improve Gaps

- Patient collapse
  - Increased call volumes (6.7%/year on average)
  - Need for medical prioritisation
  - Need for pre-arrival instructions
- Emergency medical dispatch through 995 calls
- Ambulance with EMS personnel
  - Need for sufficient ambulances (1/80,000)
  - Need for efficient ambulance deployment
  - Need for quality control and assurance
- A&E at the nearest RH

Medical oversight

Strengthen oversight and leadership

Increased public education and training

Lack of training and continuing education for EMS personnel including dispatcher

Improved technology

Ambulance regulation

Skills development
Overview

- 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

□ 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.
What can we attribute variation in survival to?

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

<table>
<thead>
<tr>
<th>Ministry of Home Affairs</th>
<th>Ministry of Health</th>
<th>Ministry of Education</th>
<th>Ministry of Defence</th>
</tr>
</thead>
<tbody>
<tr>
<td>SCDF CDA &amp; PAD</td>
<td>Hospitals ED, UPEC, NRC, NFAC, IAN</td>
<td>NYP and ITE</td>
<td>SAF, SMTI and Medical Centres</td>
</tr>
</tbody>
</table>

- Provision of EMS
- Training and continuous education for Paramedics and EMTs
- Community training

- Medical oversight
- Oversight of ambulances & MTS
- Accreditation of PEC professionals
- Coordinating agency (UPEC)
- EMT training

- Academic training for Paramedics
- Continuing education for prehospital care professionals

- Primary training site for EMTs and Paramedics vocational training
- Largest employer of Paramedics and EMTs
# 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

CPR/AED instructors

CPR/AED Certified
Anyone who attends and passes an NRC Certified CPR/AED course

DARE Trained
Anyone aged 11 and above who attend DARE training sessions.

DARE Aware: Everyone becomes aware of what we teach in DARE through social media, traditional media, or by word of mouth.
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 cardiac-pulmonary resuscitation (CPR) procedure.

The Unit for Pre-Hospital Emergency Care (Upeec) 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 limited to 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 breathing.

Yesterday, members of the Methodist Church of the Incarnation in Chua 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 includes 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 place they frequent, often in the presence of relatives, friends or neighbours.

"So by preparing for the unexpected, the skills acquired today can end up saving lives of someone we know or someone we love the future if we dare to step forward," he said.

By KAI SHENG 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 "lifeline", 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 healthcare 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 5.4 per cent to 4.4 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 fall 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, allowing for minimal additional treatment along the way.

If you are an off-duty medical or hospital doctor or have 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 Survivors 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 every year.

"In places like Seattle, Washington, survival rates are about 20 per cent," he added. "Most bystanders 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 is currently lacking in Singapore.

In Singapore, the People's Association and the National Resuscitation Council are training the public and paramedics 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 home, he said: "The first thing you think is someone you know, it's a family member or a friend. Yet it's the bystander who can make that difference.

"If you have already trained, you may already have thought of what to do. But if you haven't, you may feel anxious or unsure. So the message is: 'Just do it.' "

Besides reinforcing the idea that bystanders can save lives, Dr Ong said the event also provided an opportunity to show appreciation to those who participate in training courses.

"Even though I had learnt CPR at that moment, I was in a situation where I was able to do it. I was very tired and the strain was taking its toll. But when you compress your thoughts and remember what to do, things become easier," said Ms Tan.

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 Mr Tan. "But we are everkeen to have her back."
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
- 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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Senior Consultant and Head, Department of Emergency Medicine, SGH Clinical Associate Professor, Faculty of Medicine, NUS

**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 to be long due to traffic and accessibility problems. To see if response intervals can be improved with motorcycle based Fast Response Paramedics (FRP) compared with standard ambulances in an urban setting.

**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.

**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).

<table>
<thead>
<tr>
<th>Time of week</th>
<th>Ambulance</th>
<th>FRP</th>
<th>Difference in response time</th>
<th>$p$-value*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weekday</td>
<td>Mean ± sd</td>
<td>6.7 ± 2.4</td>
<td>6.0 ± 2.0</td>
<td>5.1</td>
</tr>
<tr>
<td></td>
<td>Range</td>
<td>8.5-3.6</td>
<td>6.0-2.5</td>
<td></td>
</tr>
<tr>
<td>Weekend</td>
<td>Mean ± sd</td>
<td>5.0 ± 4.0</td>
<td>3.0 ± 3.9</td>
<td>2.0</td>
</tr>
<tr>
<td></td>
<td>Range</td>
<td>10.0-1.5</td>
<td>6.0-3.9</td>
<td></td>
</tr>
<tr>
<td>Same station</td>
<td>Mean ± sd</td>
<td>5.0 ± 2.0</td>
<td>4.9 ± 3.8</td>
<td>1.1</td>
</tr>
<tr>
<td></td>
<td>Range</td>
<td>9.4-1.7</td>
<td>5.0-3.8</td>
<td></td>
</tr>
<tr>
<td>Different</td>
<td>Mean ± sd</td>
<td>5.0 ± 3.6</td>
<td>5.0 ± 3.6</td>
<td>0.0</td>
</tr>
<tr>
<td></td>
<td>Range</td>
<td>8.5-4.0</td>
<td>5.0-3.6</td>
<td></td>
</tr>
<tr>
<td>Location of call</td>
<td>Mean ± sd</td>
<td>6.0 ± 2.6</td>
<td>5.0 ± 2.6</td>
<td>1.0</td>
</tr>
<tr>
<td></td>
<td>Range</td>
<td>10.0-1.5</td>
<td>5.0-2.6</td>
<td></td>
</tr>
<tr>
<td>Home/Work</td>
<td>Mean ± sd</td>
<td>6.0 ± 2.0</td>
<td>5.0 ± 2.0</td>
<td>1.0</td>
</tr>
<tr>
<td></td>
<td>Range</td>
<td>8.5-1.5</td>
<td>5.0-2.0</td>
<td></td>
</tr>
<tr>
<td>Proceed/Injuries</td>
<td>Mean ± sd</td>
<td>6.0 ± 2.0</td>
<td>5.0 ± 2.0</td>
<td>1.0</td>
</tr>
<tr>
<td></td>
<td>Range</td>
<td>8.5-1.5</td>
<td>5.0-2.0</td>
<td></td>
</tr>
<tr>
<td>Traffic</td>
<td>Mean ± sd</td>
<td>6.0 ± 2.0</td>
<td>5.0 ± 2.0</td>
<td>1.0</td>
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<tr>
<td></td>
<td>Range</td>
<td>8.5-1.5</td>
<td>5.0-2.0</td>
<td></td>
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</tbody>
</table>

* 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)

Ensure a seamless integration of PEC services into ED services

Optimise ambulance catchment zone distribution amongst the EDs
Strategic Imperatives

Coordination of paramedic development

Professional recognition of paramedics

Local system of training in PEC for Emergency physicians

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
- Aspirin (Oral)
- Salbutamol
- Dextrose
- GTN
- Adrenaline (intravenous)
- Oxytocin
- Diazepam for seizures
- Enthanox/Penthrox/Tramadol
- Intraosseous
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 1st 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

<table>
<thead>
<tr>
<th>Survival - All Arrests</th>
<th>2001-2004 n=2428</th>
<th>2010-2012 n=3026</th>
<th>Adjusted OR* (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Discharged alive or Alive at 30 days</td>
<td>38 (1.6%)</td>
<td>97 (3.3%)</td>
<td>2.2 (1.5 - 3.3)</td>
</tr>
<tr>
<td>Good neurological function</td>
<td>28 (1.2%)</td>
<td>53 (1.8%)</td>
<td>1.7 (1.1 - 2.8)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Survival - Utstein Style</th>
<th>2001-2004 n=2428</th>
<th>2010-2012 n=3026</th>
<th>Adjusted OR* (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Discharged alive or Remain alive at 30 days</td>
<td>7/280 (2.5%)</td>
<td>35/317 (11.0%)</td>
<td>9.6 (2.2 – 41.9)</td>
</tr>
<tr>
<td>Good neurological function</td>
<td>6/280 (2.1%)</td>
<td>22/317 (7.0%)</td>
<td>6.0 (1.3 – 27.0)</td>
</tr>
</tbody>
</table>

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

What would it take to improve EMS in Asia?

Champions and Advocates for EMS!