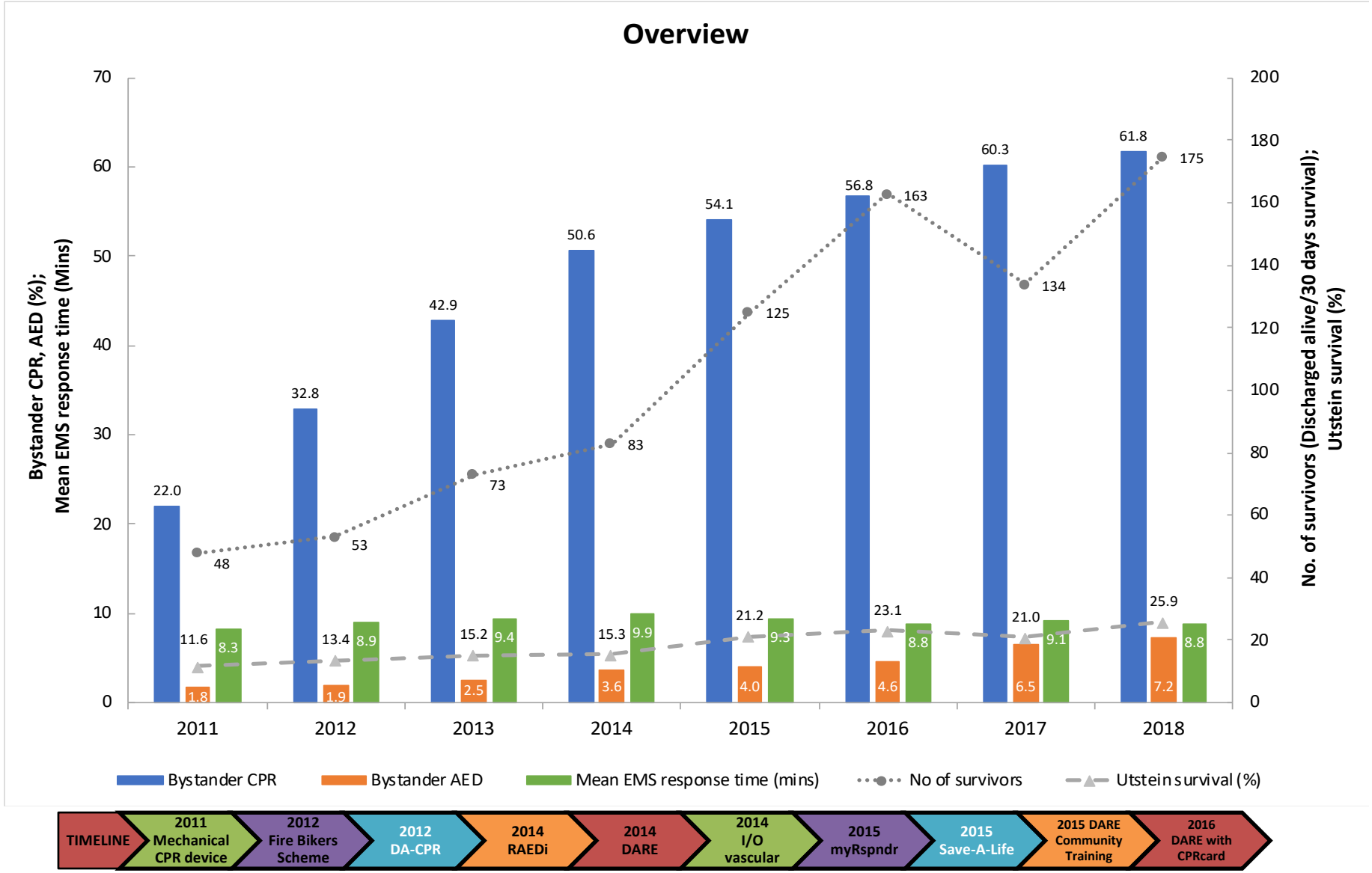
An Essential Review of How Singapore Progressed its OHCA Response Over the Years

Professor Marcus Ong

Senior Consultant and Clinician Scientist
Dept of Emergency Medicine, Singapore General Hospital
Director Health Services and Systems Research (HSSR),Duke-NUS Medical School
Head, Health Services Research Center (HSRC), Singhealth Services
Director, Health Services Research Institute
Medical Director, Unit for Prehospital Emergency Care (UPEC)
Senior Consultant, Ministry of Health, Hospital Services Division
Chairman, Pan Asian Resuscitation Outcomes Study (PAROS)

Resuscitation in Singapore

Improving OHCA Outcomes over the years



Frame of Survival

for improving OHCA outcomes in developing EMS systems

Political commitment — Healtcare expenditure — Legislative environment — Basic state of preventive health — Traffic congestion solutions

Culture of excellence — Relationship w/ government, police, fire, hospitals — Quality improvement — Emergency care network

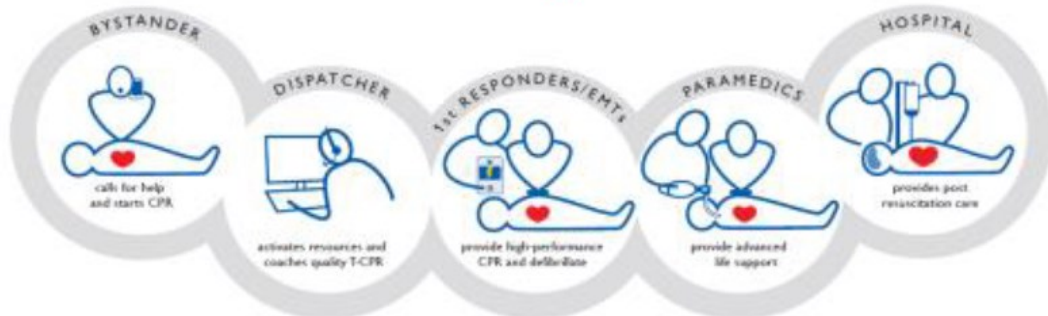
Strong EMS leadership

Cost-efficient smart technologies

Good Samaritan laws

EMS specialty development

Chain of Survival



Field to facility communication

Motivation of staff

Ambulance/ population ratio

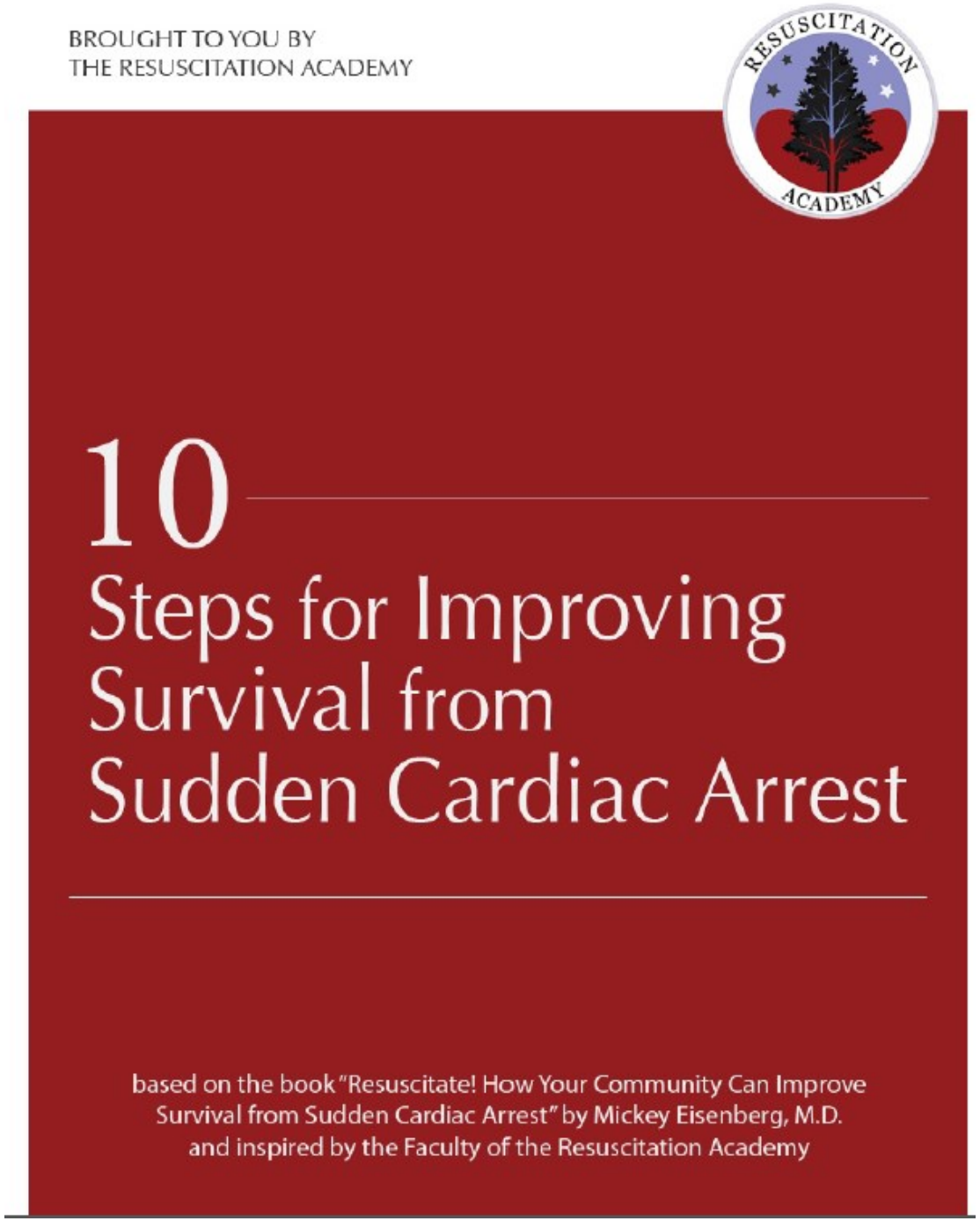
Research projects

Health seeking behavior
Appropriate use of EMS

Willing and competent
Pool of bystanders CPR/AED

Practice of giving way to ambulance

Cultural views of death and resuscitation — Cultural willingness to help strangers — Research environment — Road conditions — Reliable telecommunications



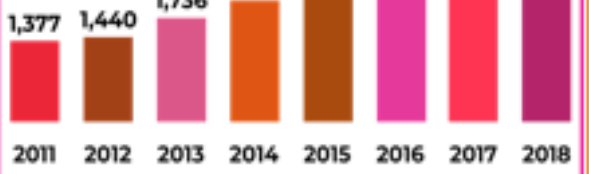
10 steps to improve cardiac arrest survival in Singapore

Step 1: Cardiac Arrest Registry:

- Cardiac Arrest and Resuscitation Epidemiology (CAREI) : Epidemiology of OHCA in Singapore -1 Oct 2001 to 30 Apr 2002
- CARE II: Prospective clinical trial of adrenaline in OHCA -1 Oct 2002 to 14 Oct 2004
- CARE III: Geospatial analysis of ambulance demand - 1 January 2006 to 31 May 2006
- CARE IV: Smart Ambulance Deployment -Ongoing
- Pan Asian Resuscitation Outcomes Study (PAROS) >200,000 cases recruited

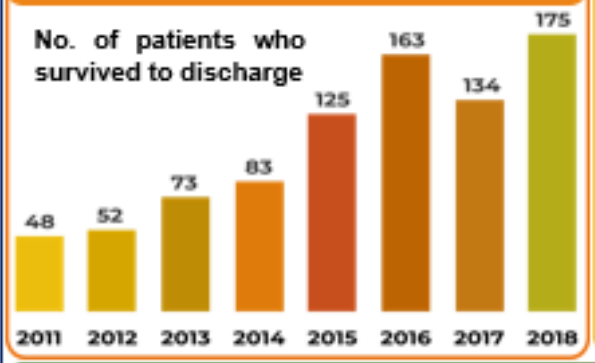
OUT-OF-HOSPITAL CARDIAC ARREST (OHCA) IN SINGAPORE - 2011 to 2018

OHCA PATIENTS



The number of out-of-hospital cardiac arrests per year is increasing. But it is encouraging to see sustained increases in our bystander CPR and AED use rates, and survival outcomes.

SURVIVED-TO-DISCHARGE

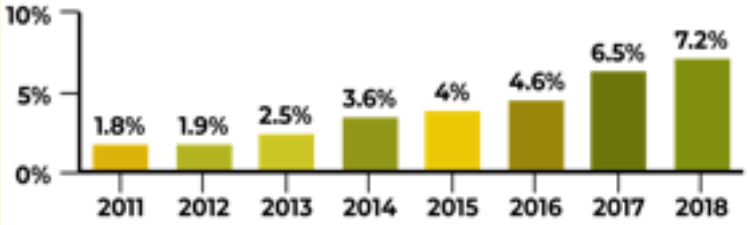


BYSTANDER CPR

Bystander CPR from 2011 to 2018

A person who suffers a cardiac arrest can experience death within minutes, with the chances of survival dropping by 10% for every minute without CPR.

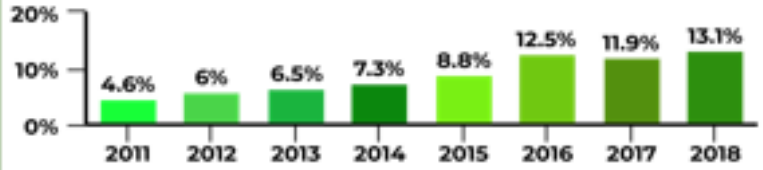
BYSTANDER AED



Bystander AED from 2011 to 2018

Bystander AED use is a critical indicator to watch because early application of an AED can more than double the survival rate.

EMS RETURN OF SPONTANEOUS CIRCULATION (ROSC)

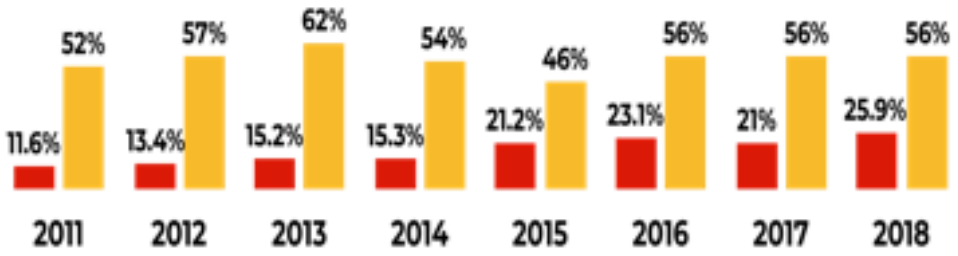


ROSC at scene/ en route - 2011 to 2018

EMS Return of Spontaneous Circulation (ROSC) is another important indicator to monitor because it is an initial indicator of the effectiveness of resuscitation in the field.

UTSTEIN SURVIVAL (WITNESSED, SHOCKABLE ARRESTS)

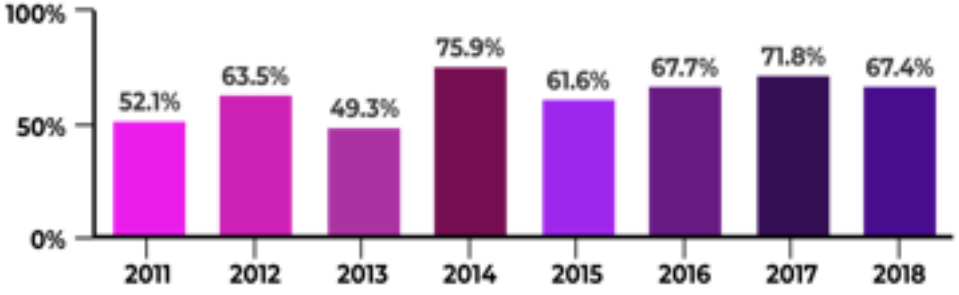
Comparison of Utstein survival rates between 2 cities



Singapore Seattle & King County (USA)

The Utstein survival rate is an internationally accepted benchmark measure used to monitor how well we are doing with our overall efforts to improve the entire chain of survival. The Singapore Utstein survival rate has more than doubled between 2011 and 2018, but we have a ways to go before catching up with Seattle, King County (United States) that has one of the highest sudden cardiac arrest survival rates in the world.

GOOD-TO-MODERATE NEUROLOGICAL OUTCOME

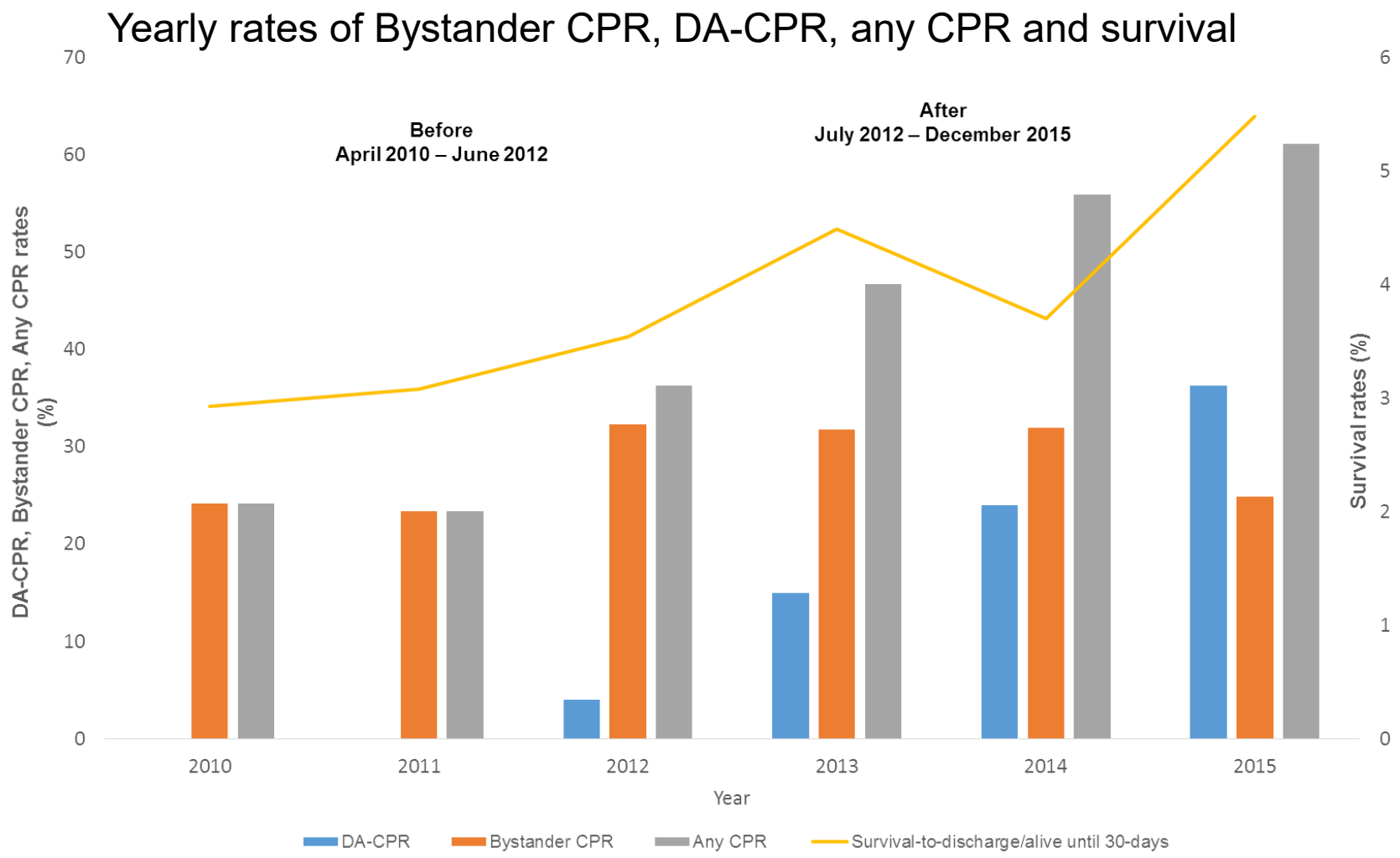


Patients who survived to discharge with good-to-moderate neurological function

Survival-to-discharge with good-to-moderate neurological functioning is the gold standard for OHCA survival.

Source: Singapore Out-of-Hospital Cardiac Arrest Data Report (2011-2018) and https://www.kingcounty.gov/depts/health/emergency-medical-services/reports.aspx. *EMS-Emergency Medical Services

Step 2: Telephone CPR Program



Improving Access - 995

- Ambulance is on the way, stay on the line
- Dispatcher will give instructions for CPR
- Keep doing CPR till ambulance arrives

Resuscitation 102 (2016) 85–93

Contents lists available at ScienceDirect

Resuscitation

Journal homepage: www.elsevier.com/locate/resuscitation

Clinical paper

A before–after interventional trial of dispatcher-assisted cardio-pulmonary resuscitation for out-of-hospital cardiac arrests in Singapore☆

Sumitro Harjanto[a], May Xue Bi Na[b], Ying Hao[c], Yih Yng Ng[d], Nausheen Doctor[e], E. Shaun Goh[f], Benjamin Sieu-Hon Leong[g], Han Nee Gan[h], Michael Yih Chong Chia[i], Lai Peng Tham[j], Si Oon Cheah[k], Nur Shahidah[e], Marcus Eng Hock Ong[e,l,*], For the PAROS study group

[a] Duke-NUS Medical School, Singapore, Singapore
[b] Yong Loo Lin School of Medicine, National University of Singapore, Singapore, Singapore
[c] Division of Research, Singapore General Hospital, Singapore, Singapore
[d] Medical Department, Singapore Civil Defence Force, Singapore, Singapore
[e] Department of Emergency Medicine, Singapore General Hospital, Singapore, Singapore
[f] Department of Acute and Emergency Care, Khoo Teck Puat Hospital, Singapore, Singapore
[g] Emergency Medicine Department, National University Hospital, Singapore, Singapore
[h] Accident & Emergency, Changi General Hospital, Singapore, Singapore
[i] Emergency Department, Tan Tock Seng Hospital, Singapore, Singapore
[j] Children's Emergency, KK Women's and Children's Hospital, Singapore, Singapore
[k] Emergency Medicine Department, Alexandra Hospital, Singapore, Singapore
[l] Health Services & Systems Research, Duke-NUS Medical School, Singapore, Singapore

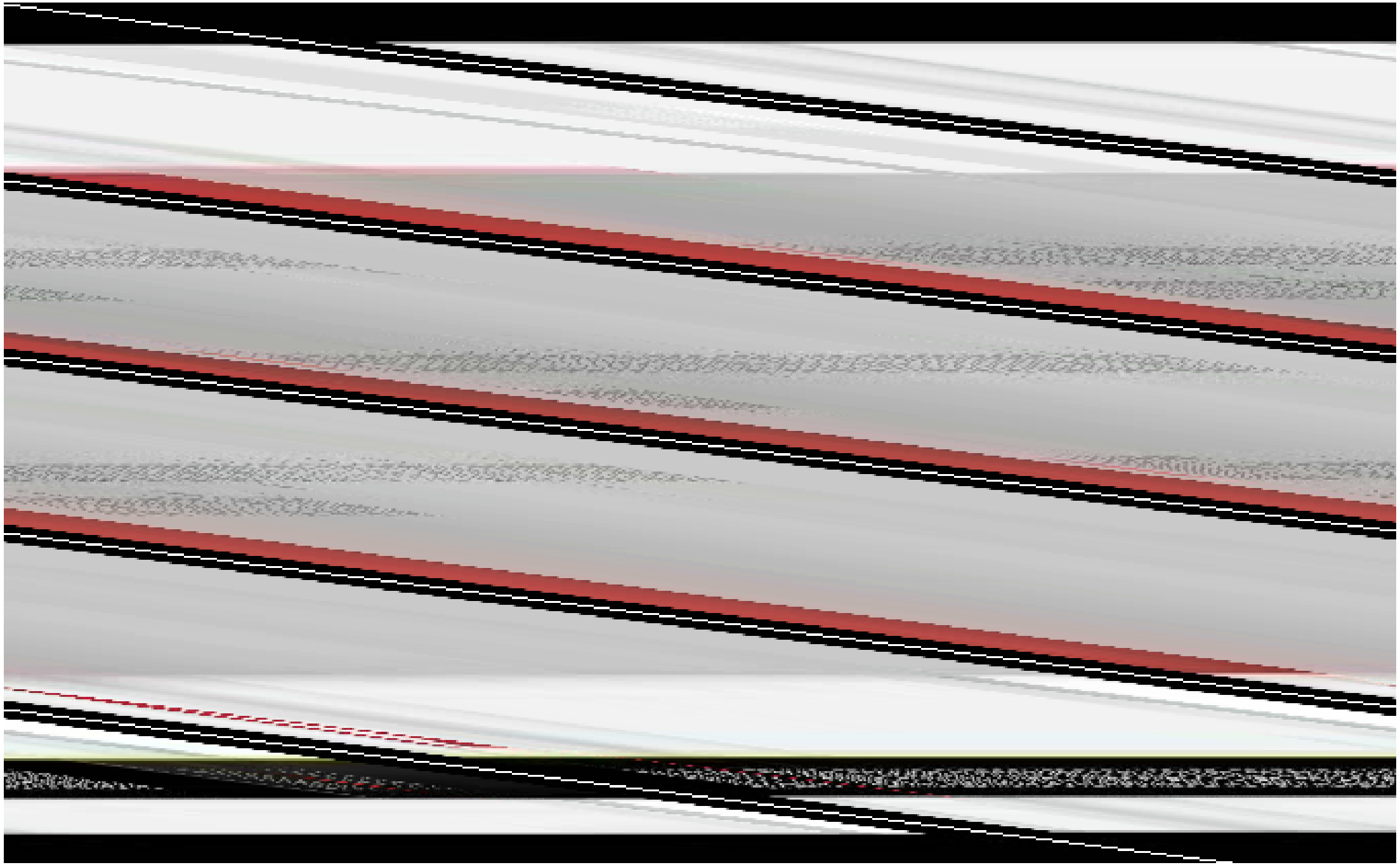
ARTICLE INFO

Article history:
Received 30 July 2015
Received in revised form 10 February 2016
Accepted 17 February 2016

Keywords:
Dispatcher-assisted
Cardiopulmonary resuscitation
Survival
Cardiac arrest

ABSTRACT

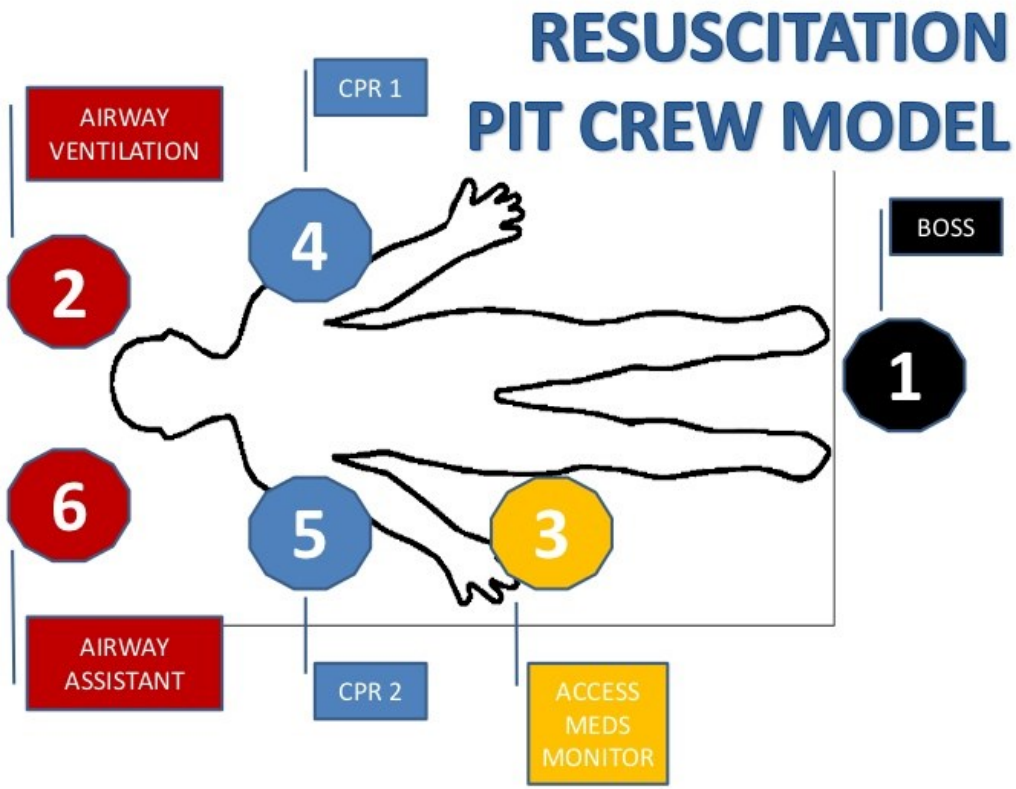
Aim: To evaluate the effects of a comprehensive dispatcher-assisted CPR (DACPR) training program on bystander CPR (BCPR) rate and the outcomes of out-of-hospital cardiac arrest (OHCA) in Singapore.
Methods: This is an initial program evaluation of a national DACPR intervention. A before–after analysis was conducted using OHCA cases retrieved from a local registry and DACPR information derived from audio recordings and ambulance notes. The primary outcomes were survival to admission, survival at 30 days post-arrest and good functional recovery.
Results: Data was collected before the intervention (April 2010 to December 2011), during the run-in period (January 2012 to June 2012) and after the intervention (July 2012 to February 2013). A total of 2968 cases were included in the study with a mean age of 65.6. Overall survival rate was 3.9% (116) with good functional recovery in 2.2% (66) of the patients. BCPR rate increased from 22.4% to 42.1% ($p < 0.001$) with odds ratio (OR) of 2.52 (95% confidence interval [CI]: 2.09–3.04) and ROSC increased significantly from 26.5% to 31.2% ($p = 0.02$) with OR of 1.26 (95%CI: 1.04–1.53) after the intervention. Significantly higher survival at 30 days was observed for patients who received BCPR from a trained person as compared to no BCPR ($p = 0.001$, OR = 2.07 [95%CI: 1.41–3.02]) and DACPR ($p = 0.04$, OR = 0.30 [95%CI: 0.04–2.18]).
Conclusion: A significant increase in BCPR and ROSC was observed after the intervention. There was a trend to suggest improved survival outcomes with the intervention pending further results from the trial.



Step 3: High Performance CPR

EMS2017
COPENHAGEN

HP-CPR: Basic and Advanced Life Support combined



Firefighters roped in for cardiac first aid

More than 300 have been certified to help in emergency treatment for cardiac arrests

Shelina Ajit Assomull

From next year, fire trucks may be seen racing ahead of ambulances to help victims of cardiac arrest.

Given that they are usually the first to arrive at the scene of an emergency, firefighters will be roped in to help save lives, and more than 300 have been certified as emergency medical technicians.

This means that on top of basic first aid, they have learnt high-performance cardiopulmonary resuscitation (CPR). This is a method that uses a larger team working simultaneously to perform CPR faster and more effectively.

It is among several new measures to improve the emergency treatment of cardiac arrest victims, nearly four in five of whom now die.

The Singapore Civil Defence Force (SCDF) and Singapore General Hospital (SGH) will be implementing the new measures over a four-year period.

Currently, an ambulance takes an average of 11 minutes to reach the scene. A fire bike usually gets to the destination in half the time.

Under the new protocol, the fire bike will be joined by a fire truck, estimated to reach the scene within eight minutes, with four trained firefighters on board.

Together with paramedics, the respondents will form a "Formula One team" that "works together to ensure everything is done in less time", said Professor Marcus Ong, a senior consultant at the department of emergency medicine at SGH.

Speed is paramount in the event of a cardiac arrest as the highest chance of survival occurs in the first 10 minutes. Last year, there were more than 2,500 such ambulance emergencies, and just 21.3 per cent of the victims survived.

Prof Ong believes the new interventions will push this figure up to around 30 per cent.

Besides the deployment of firefighters, another change is to rely less on computers to assess whether a victim needs defibrillation, in which a machine is used to assess the need for a dose of electric current to the heart. Instead, paramedics will now do a manual assessment, which is quicker.

Prof Ong said that computers take 10 to 20 seconds to make a decision that a trained paramedic could do in two. "It will mean more training for our paramedics, but in these situations, every second counts," he added.

A new device will also be attached to regular ventilating systems to enhance the heart's ability to pump blood around the body.

Lastly, a new type of injection to correct life-threatening heart rhythms will be introduced. About 250 paramedics will be trained in the three new interventions.

Mr Zane Ang, 28, an advanced care paramedic with the SCDF, said the new measures should help to improve survival rates.

"Although there is new pressure on the paramedics, it is doable, but there are precautions we will take," said Mr Ang.

SCDF chief medical officer Ng Yih Yng said: "If untreated in a cardiac arrest emergency, there is a 98 per cent chance you will die. These interventions require more skills to train but it's to tackle a difficult problem."

shelinaa@sph.com.sg

Singapore Civil Defence Force paramedics performing CPR at a media demonstration of new intervention techniques. PHOTO: LIANHE ZAOBAO

2,500

There were more than this number of cases of cardiac arrest that were ambulance emergencies here last year; only 21.3 per cent of the victims survived.

Step 4: Rapid Dispatch

'995' calls being sorted to give priority to serious cases

Tiered response comes amid staff crunch, surging number of calls and false alarms

Tan Tam Mei

The Singapore Civil Defence Force (SCDF) has started differentiating 995 calls based on the severity of patients' medical conditions, to deploy resources better and faster to more severe cases.

The shift to a new Emergency Medical Services (EMS) tiered-response framework comes amid tightening manpower resources and a surging number of 995 calls, with a rising proportion of false alarms and non-emergency calls among them.

Last year, the SCDF handled close to 180,000 emergency calls, or about 500 a day. Of these, almost 19,000, or about 10 per cent, were false alarms and for non-urgent ailments such as constipation and chronic cough. The percentage rose from 5.3 per cent in 2015 and 4.6 per cent in 2014.

Law and Home Affairs Minister K. Shanmugam said that while the SCDF has boosted the number of ambulances, paramedics and emergency medical technicians to deal with the rising demand, it is not a sustainable solution and the number of calls will only rise as Singapore faces an ageing population.

"If we don't do something, we will not be able to provide the necessary care to the most critical emergency cases," said Mr Shanmugam, who announced the framework at the SCDF workplan seminar yesterday.

Previously, EMS responses were based on a single-tier system where SCDF responded to all emergency medical and trauma cases on a first-come, first-served basis within the standard 11 minutes.

Under the new framework, which will be implemented in phases over the next few years, callers who do not require emergency response will be advised to seek outpatient treatment at nearby clinics.

A Fire Medical Vehicle on display at SCDF's annual workplan seminar yesterday. The SCDF will roll out these vehicles later this month, and they will be deployed in less severe emergencies such as minor road traffic accidents. ST PHOTO: MARK CHEONG

Those who insist on visiting a hospital will be asked to either call private non-emergency medical transport services or make their own way to a hospital via other forms of transport.

Under the first implementation phase, which began on April 1 and is set to last until 2019, the SCDF 995 Operations Call Centre has started sorting calls based on a series of quick questions.

It has also trained 230 fire and rescue specialists who will ride fire bikes equipped with medical bags and will typically respond to severe emergency cases together with an ambulance.

Later this month, SCDF will roll out new Fire Medical Vehicles – engineered and built by home-grown engineering company Hope Technik – which will be deployed in less severe emergencies such as minor road traffic accidents.

Mr Shanmugam said the SCDF will partner the Ministry of Health later this year to train at least 300 residents from each constituency with life-saving skills through the Dispatcher Assisted First Responder Plus programme.

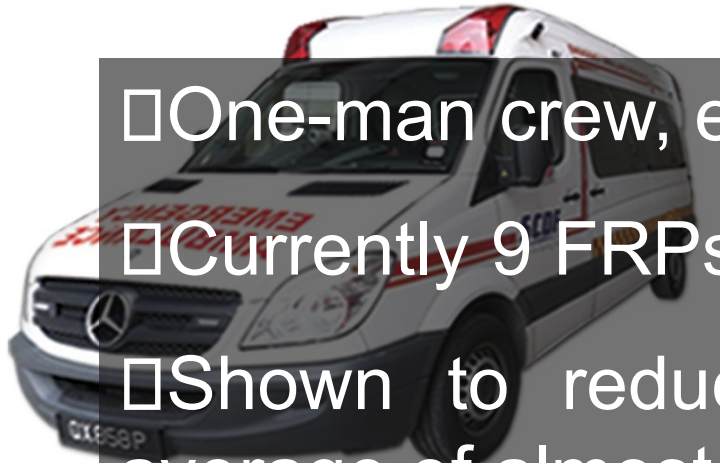
Associate Professor Marcus Ong, director of the Unit for Prehospital Emergency Care in the Health Ministry, said the tiered framework is similar to the way emergency departments operate in hospitals.

"Those with more critical and severe conditions will be attended to first. The priority is to save lives and treat those who are in most urgent need," he added.

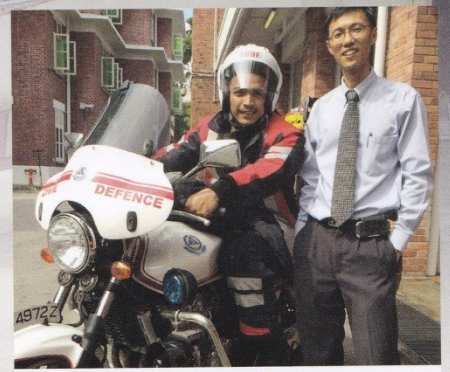
tammei@sph.com.sg

SEE TOP OF THE NEWS A6

Firebiker with AED



- One-man crew, equipped with AED
- Currently 9 FRPs in service
- Shown to reduce response times by an average of almost 5 minutes
- Adding more Firebiker units



Marcus Ong with motorbike ambulance paramedic.

EMERGENCY MEDICAL SERVICE TIERED-RESPONSE VEHICLES

Fire appliances with Emergency Medical Technicians (EMTs) onboard will be deployed to enhance response to patients in critical condition.

COMPRESSED AIR FOAM PUMP LADDER (CAF PL)

The CAF PL crew includes an EMT who is able to stabilise casualties in the midst of fire-fighting and rescue operations.

FIRE BIKE

The mobility of the Fire Bike allows it to arrive at scene ahead of all other appliances. Thus, the EMT is able to render immediate medical assistance to the victim.

FIRE MEDICAL VEHICLE (FMV)

The FMV has fire and rescue capabilities. On top of that, it has a fully functioning ambulance cabin which allows for patient treatment and conveyance to hospital.

AMBULANCE

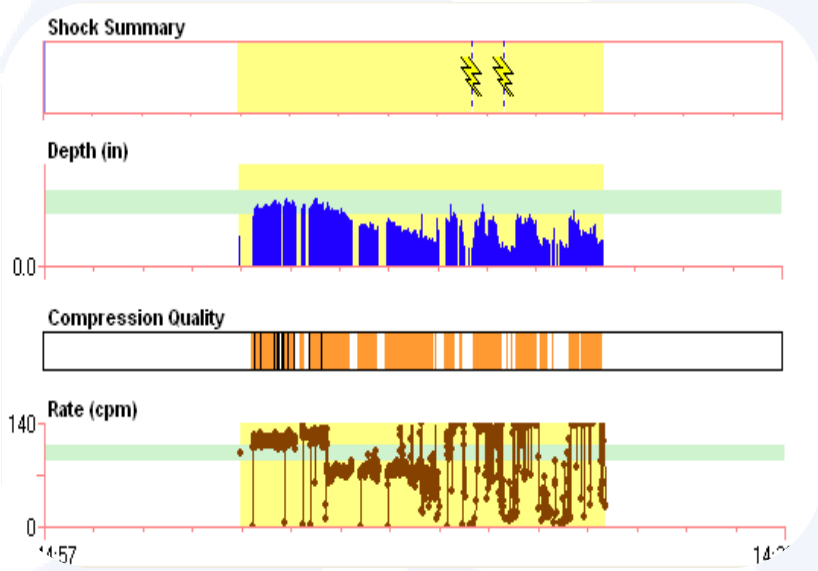
Leveraging on cutting-edge technology and manned by a highly-trained crew, the ambulance is able to handle the most complex medical emergencies.

5TH GENERATION LIGHT FIRE ATTACK VEHICLE (LF5G)

The LF5G crew, which includes an EMT, provides rapid response for fire and rescue incidents. Equipped with medical equipment, the LF5G is designed to respond to medical emergencies.

EMS2017 COPENHAGEN

Step 5: Measurement of Professional Resuscitation



HP-CPR

Measurement

EMS2017
COPENHAGEN

Measurement of Resuscitation Performance

Public Access Defibrillation

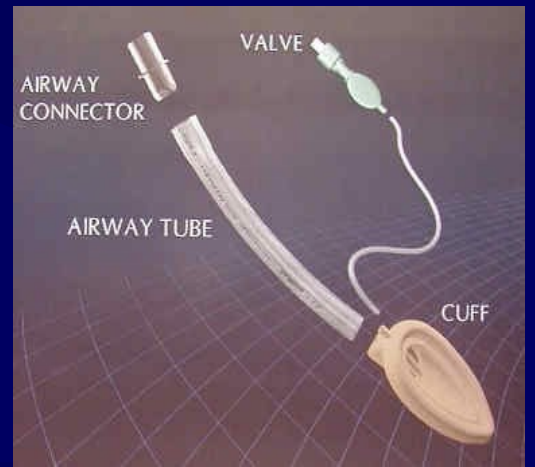
Defibrillator Code Review

Audio Recording

Body Worn Cameras

Early basic and advanced care

- Oxygen
- Airway adjuncts
- IV fluids
- Laryngeal mask airway
- Asprin (Oral)
- GTN
- Adrenaline (intravenous)
- Intraosseous Devices
- Mechanical CPR



Intraosseous Vascular Access for Cardiac Arrest: RCT

A paramedic demonstrates how a small drill-needle can be inserted into the leg bone below a patient's knee cap. This will be used to inject a shot of adrenaline to save a person who has suffered cardiac arrest.
PHOTO: LIANHE ZAOBAO

A shot in the leg bone to save cardiac arrest victims

By KASH CHEONG

PARAMEDICS here are testing a new way to get adrenaline to the heart of cardiac arrest victims – by drilling below the knee.

The Singapore Civil Defence Force (SCDF) and the Singapore General Hospital hope this could raise survival rates.

During a cardiac arrest, adrenaline, in addition to cardiopulmonary resuscitation (CPR) or an electric shock, is used to stimulate the heart and make it pump again, said Associate Professor Marcus Ong, senior consultant at SGH's Department of Emergency Medicine.

The adrenaline is usually delivered through an intravenous line in a vein in the arm. However, this is a challenge, explained SCDF's chief medical officer Ng Yih Yng.

"It's hard for paramedics to find the vein. It is flat during a cardiac arrest since there is no blood pumping through," he said.

Now, if intravenous insertion is not possible, paramedics will insert a 25mm-long needle into the leg bone below the patient's knee cap. This will be used to drill a small hole in the bone, which allows access to the bone marrow underneath, which connects to the body's circulatory system.

A shot of adrenaline, which is meant to constrict veins and restore blood flow, is then delivered into the bone marrow using a syringe.

This method could work more than 90 per cent of the time, compared to 50 per cent for the intravenous line, said Colonel Dr Ng. "The patient does not feel any pain because he would be unconscious during a cardiac arrest."

Paramedics will use the drill only if they fail to insert an intravenous line after two attempts, Prof Ong said.

The drill method is more expensive as each of these one-time-use drill-needles costs about $200, while intravenous lines cost less than $2.

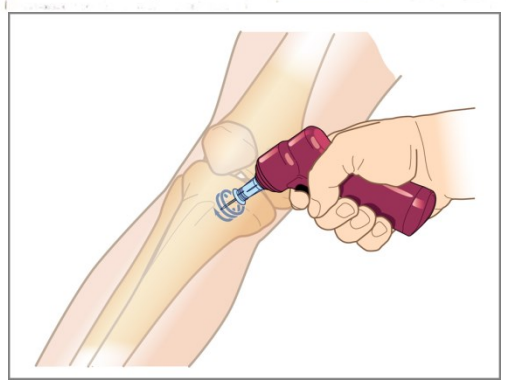
From this month, SCDF and SGH will evaluate the effectiveness of the drill method on 400 cardiac arrest patients, and test if the benefits outweigh the cost.

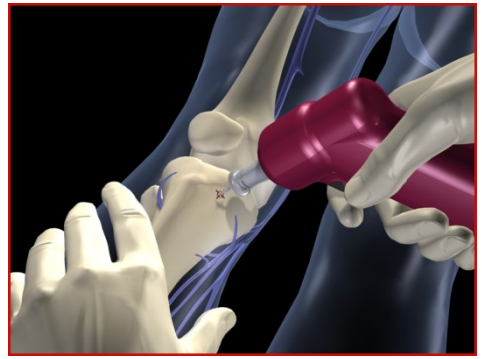
Over 160 SCDF paramedics have been trained to use the medical drill, which is already used in public hospitals here.

Every year, about 1,800 people here collapse from cardiac arrest outside the hospital. About 3 per cent survive.

"Hopefully, we can bring up survival rates if we are able to get the life-saving adrenaline to them in a more effective way," said Prof Ong. "The public also has an important role in saving a life, by starting CPR as soon as possible."

kashc@sph.com.sg





Step 6: AED Program

- SCDF installing AEDs in all public apartments near lifts
- National AED Registry

民防部队推展“救人一命”计划

组屋地面层安置心脏除颤器

参与六个月计划的六邻里包括勿洛、武吉班让、蔡厝港、巴西立西、拉丁马士和淡滨尼西组屋区。民防部队预计到了2017年，在这些邻里安装多240个除颤器，达400个，确保在每两三座组屋的范围内备有一个除颤器。

苏文琪　报道
suwenqi@sph.com.sg

本地六个邻里率先在组屋地面层安装160个自动心脏除颤器，希望提高公众的救助意识，随时挺身而出“救人一命”。

这项试行措施是新加坡民防部队“救人一命”（Save a Life）计划的其中一环，在更多公共场所放置自动心脏除颤器（AED），进一步完善急救硬件设备。

参与六个月计划的邻里包括勿洛、武吉班让、蔡厝港、巴西立西、拉丁马士和淡滨尼西组屋区。民防部队预计到了2017年，在这些邻里安装多240个除颤器，达400个，确保在每两三座组屋的范围内备有一个除颤器。民防最终目标是在所有邻里推行这项计划。

副总理兼国家安全统筹部长及内政部长张志贤昨晚在白沙组屋区主持推介仪式。

张志贤也是白沙—榜鹅集选区议员。他告诉媒体，随着越来越多人接受急救训练，作为“心件”的民众更需“硬件”才能在紧急时刻发挥作用。

民防部队总医务官黄毅莹医生上校受访时透露，去年有超过1900人死于心脏骤停，仅约60人被救活。约七成个案发生在住宅区，因此在组屋地面层放置除颤器，可让更多人及时获救，提高生还率。

一般上，患者在心脏骤停后，若缺氧四分钟，可能导致永久性脑损，10分钟就可能脑死。进行胸外按压可改善心肌供氧，避免情况恶化。

配合“救人一命”计划，民防部队也于今年4月推出“myResponder”应用软件，为用户指出最靠近的除颤器急救设备地点，若用户附近有心脏病发作者，也能通过软件获得通知。

软件采纳自动心脏除颤器网上注册处的资料，该注册处是由民防部队与新加坡心脏基金会联合推出。

与其他类似应用软件相比，该软件只显示那些公众可轻易拿到除颤器的地点，而不是所有备有除颤器的地点。

黄毅莹说，这是为确保信息实用和可靠，民防部队正努力说服更多建筑管理者合作分享信息和资源。“如果有人急需使用某个建筑内的除颤器，却被保安人员挡下，反而适得其反。”

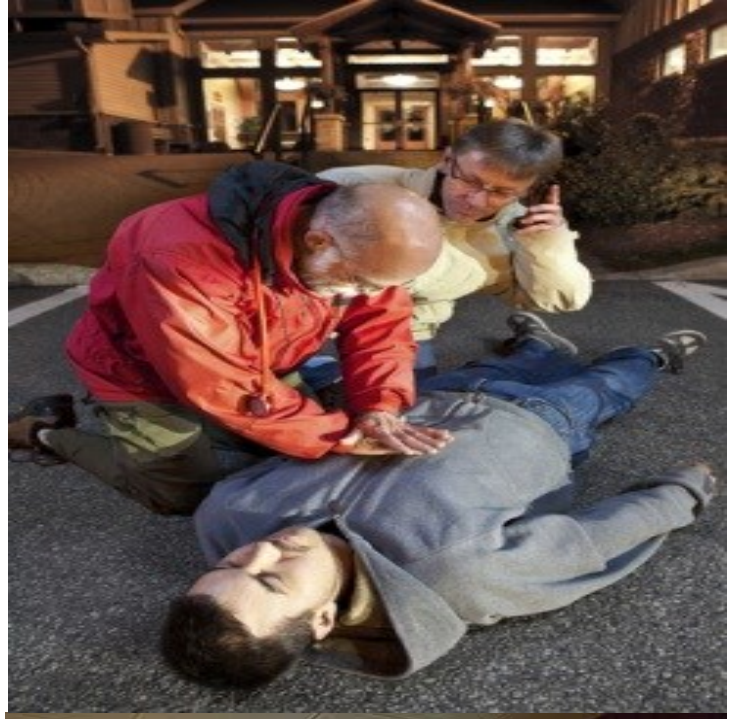
民防部队也鼓励建筑管理者把急救设备放在显眼位置，有任何更动要通知民防部队更新信息。

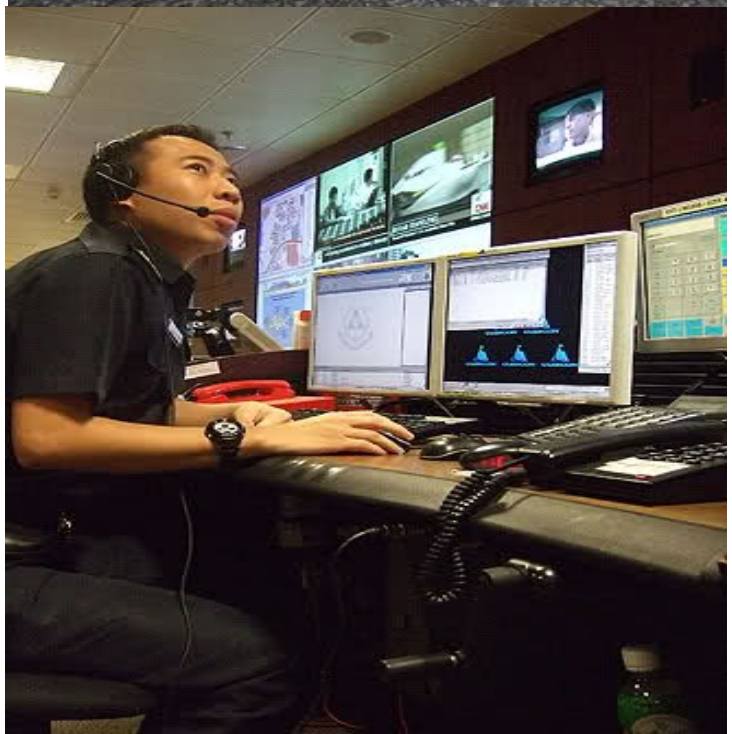
张志贤回答记者询问时说：“这是开放式平台，我们欢迎任何人提供相关资料，一起完善整个系统。”

中央医院院前护理急救单位医疗处长王英福副教授说，该软件有效结合社区和专业急救员的能力，以及急救设备去抢救病患，相信能改善本地心脏骤停的生还率。

在训练方面，民防部队去年和中央医院入院前护理急救单位展开“DARE”（Dispatcher Assisted first Responder）的速成先遣急救员培训计划，利用视频与示范，在一小时内教导公众进行心肺复苏术和使用除颤器。计划目前已从学校扩大至社区，鼓励更多人掌握急救技术。

副总理兼国家安全统筹部长及内政部长张志贤（右一）昨晚在巴西立西一座组屋地面层与年轻居民，为民防部队“救人一命”计划主持推介仪式。（蔡婉婷摄）





Bystander CPR and OHCA survival:

Six regions of Singapore saturated with trained and equipped volunteers with AED access

Unit for Pre-hospital Emergency Care (UPEC)

sph A SINGAPORE PRESS HOLDINGS PUBLICATION

我报 MyPaper

mypaper.sg MCI(P) 146/10/2014 星期五 2015年7月24日

» 国人对新加坡社会看法改善

咨询公司对新加坡公民和永久居民展开调查，让他们选最能形容新加坡社会的词汇。结果显示，与3年前相比，国人眼中的新加坡社会较正面，是享有“教育机会”、“和平”及“安全”的国家。**本地新闻B2**

» 希腊第2轮纾困投票通过

希腊国会从前晚就新纾困方案的第2轮投票进行辩论，一直讨论到昨天凌晨，终于以大比数顺利通过。当国会就纾困方案进行辩论时，约9000民众在国会外聚集，反对进一步财政紧缩。**世界新闻B4**

» 金秀贤同父异母妹妹沾光被批

韩国歌手金珠娜发行为韩剧献唱的插曲，自爆是“金秀贤同父异母妹妹”博版面，间接曝光金秀贤歌手老爸金忠勋23年前疑“偷吃”往事，被网友狠批。**娱乐B12**

协助更多心脏病发者 救命App使用率待提高

苏文琪

通知公众就近协助疑似心脏病发者的手机应用软件，已推出超过3个月，用户使用率仍有待提高，以帮助更多患者，增加对方的存活机会。

民防部队于今年4月17日推出的“myResponder”应用软件，至今的下载量约2500次。该软件可指出设有自动心脏除颤器（AED）最靠近的地点，也可用于通知用户附近有心脏病发者。

当局接获疑似心脏骤停个案的通报后，会立刻用软件通知在事发地点400公尺内的用户。只有已注册为“社区急救员”的700多名用户才会接到通知。

过去3个月，民防部队共发出约1000则急救通知，当中六成确为心脏骤停个案。不过，仅不到5%的通知获公众回应。45起获回应个案中，有15起确为心脏骤停个案。

民防部队总医务官黄毅莹医生上校说，即使没有接受过急救训练，公众还是可以注册为急救员。接获通知时，他们可帮忙取来最靠近的自动心脏除颤器，或在民防接线员的指导下为患者进行心外按摩，或协助指引救护人员到事发地点。

他说：“心脏骤停的情况下，每一秒都非常重要，有人及时介入帮忙，将增加患者的存活机会。”

另外，软件现虽以处理心脏骤停个案为主，用户仍可借由软件通知民防部队其他紧急事故，当局会通过定位技术得知通报者的位置。

目前获回应个案中，未有心脏骤停者成功存活，但获援助的其他患者都从中受益。

邻里主动应急计划志愿者彭秀翠（左）和拉詹在接获“myResponder”应用软件的通知后，能赶在救护车之前到场，及时为患者提供援助。（周柏荣摄）

Step 7: Smart Technology

1

Dial 995 and send your geo-location at the same time

myResponder

SCDF

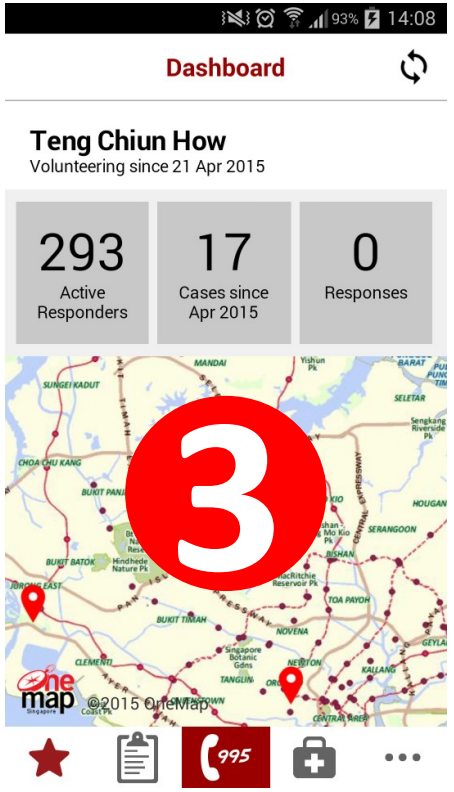
The Life Saving Force

2

Know where the nearest AED is located

ANDROID APP ON Google play

Available on the App Store



3

Sign up as a volunteer responder

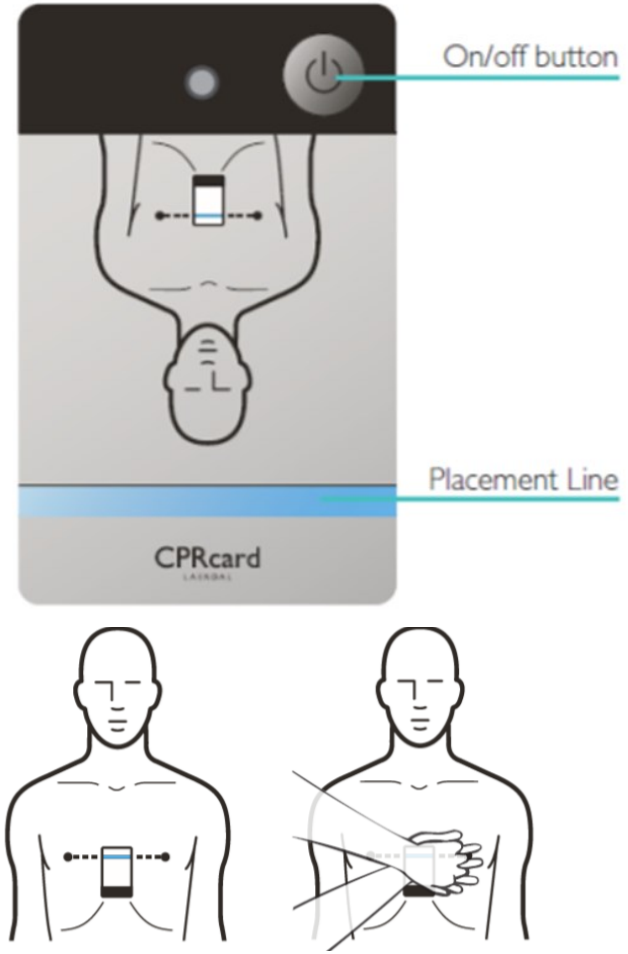
UNIT FOR PRE-HOSPITAL EMERGENCY CARE
UPEC
SINGAPORE

DORE

SAVE A HEART SAVE A LIFE

The CPRcard™

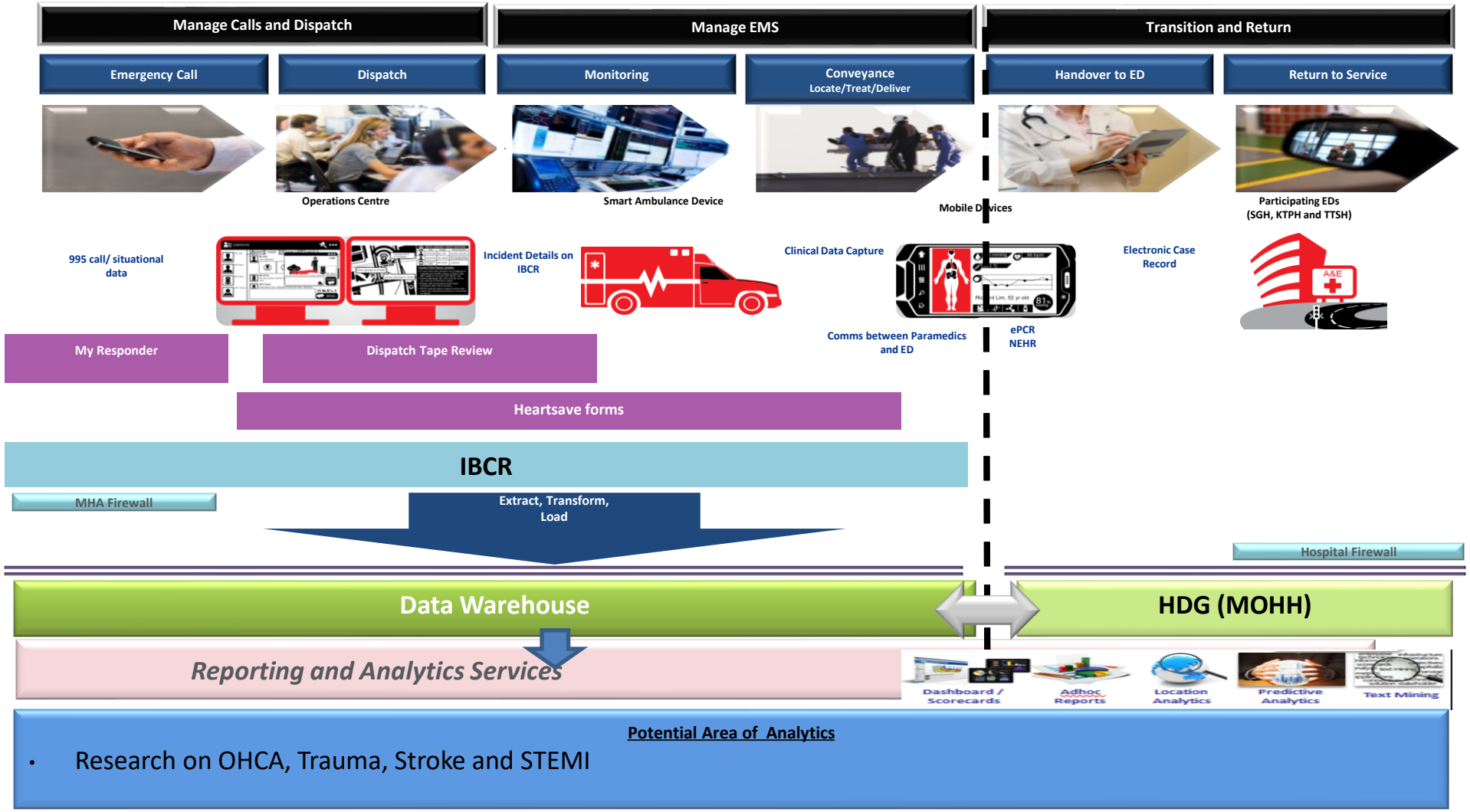
- Personal credit card size device
- Assists with land-marking
- Provides visual rate and depth range of compressions
- Collects data re: quality of chest compressions



DORE
SAVE A HEART SAVE A LIFE

UNIT FOR PRE-HOSPITAL EMERGENCY CARE
UPEC
SINGAPORE

Healthcare Big Data and Advanced Analytics



Potential Area of Analytics

- Research on OHCA, Trauma, Stroke and STEMI

Therapeutic Hypothermia Treatment

Cooling the body can 'cut risk of fatality' after cardiac arrest

By POON CHIAN HUI

CARDIAC arrest sufferers can be kept alive using a new technique that cools their bodies to below the normal temperature and then slowly reheats them.

The "therapeutic hypothermia" treatment more than triples their chances of surviving, according to preliminary results of a clinical trial in Singapore.

It also reduces the risk of brain damage – a common problem among those who live.

The technique – which is already used in countries such as Australia – spells new hope for the 1,500 people in Singapore who suffer a cardiac arrest outside hospital every year.

At the moment, their survival rate is a dismal 2.7 per cent.

First, the patient's body is rapidly cooled to between 32 deg C and 34 deg C. This is done either by wrapping large cooling-gel pads around the torso and legs or by pumping cool saline into a catheter that is inserted into the body.

The temperature is then maintained for 24 hours while the patient is put into a medically induced coma.

After that, the body is gradually warmed to the normal 36.5 deg C.

Bringing the temperature down helps to save barely alive cells, said Associate Professor Marcus Ong, who is the lead researcher in the trial at Singapore General Hospital (SGH).

This is because when oxygen is cut off during a cardiac arrest, "it starts a chain reaction that ultimately leads to cell death".

But when the cells are cooled, they do not need as much oxygen, which reduces the damage.

"If left alone, the area of damage would increase and becomes permanent," added Prof Ong, a senior consultant in emergency medicine at the hospital.

Forty cardiac arrest patients aged 18 to 80 were involved in the clinical trial between 2008 and last year.

Most of the survivors given conventional intensive care ended up in a coma or vegetative state.

By contrast, more than half of the patients who received the hypothermia treatment woke up with minimal brain damage.

They include information technology manager Peng Hua, who collapsed suddenly at work last September.

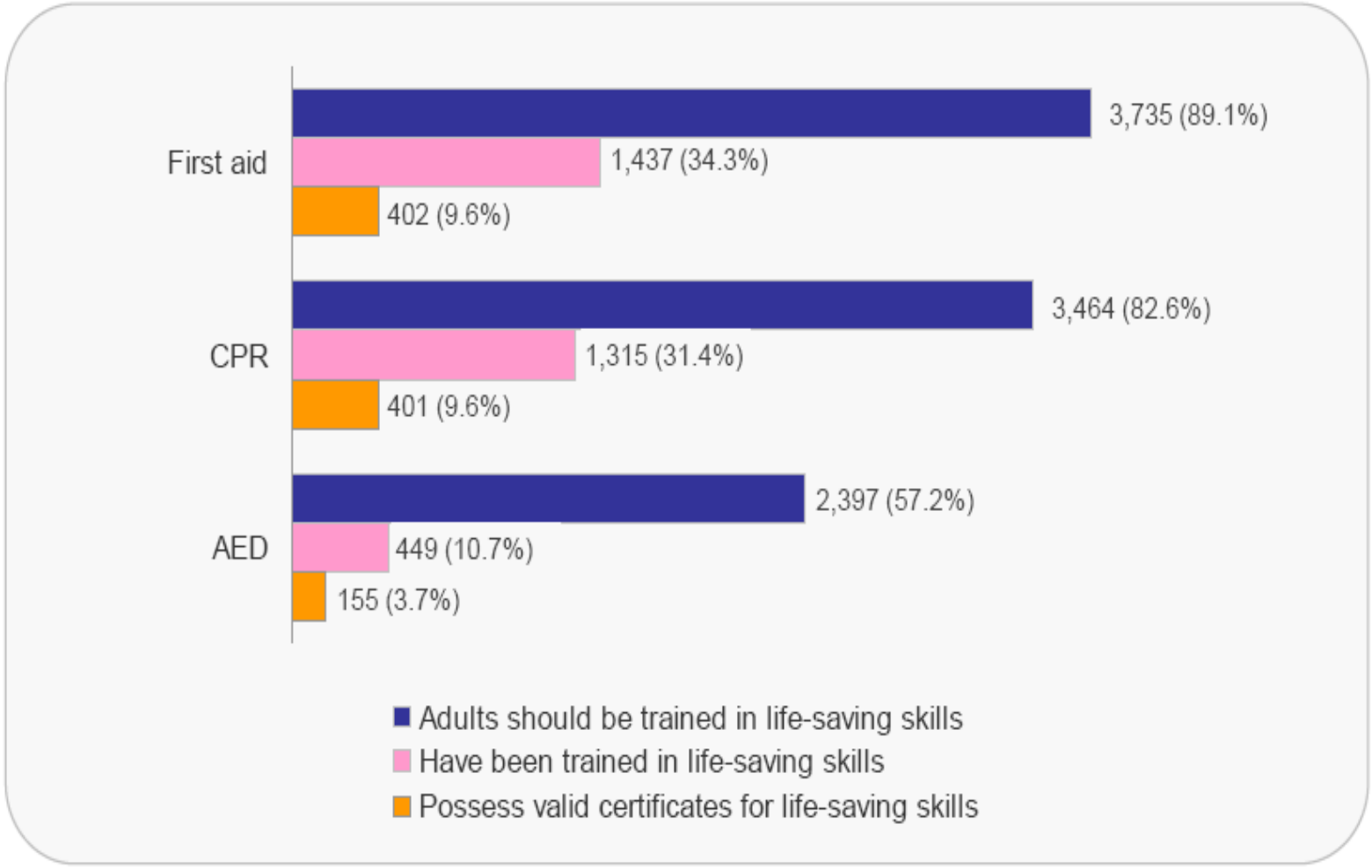
Colleagues and paramedics managed to resuscitate him. And by the time the 39-year-old arrived at hospital, his heart had started beating again.

He was then cooled and slowly

"Therapeutic hypothermia" lowers the body temperature and protects neurological function ----> survival increased from 16% (4 survivors) to 44% (11 survivors) .

Pilot prospective study of therapeutic hypothermia for treatment of post-cardiac arrest patients. Ng M, Wong AS, Chew HC, Shahidah N, Pek PP, Poh J, Chin CT, Chua TS, Ong ME. Int J Cardiol. 2014 May 15;173(3):612-3

Step 8: Mandatory Training for CPR/AED



Dispatcher-**A**ssisted First **Re**sponder Programme (**DARE**)

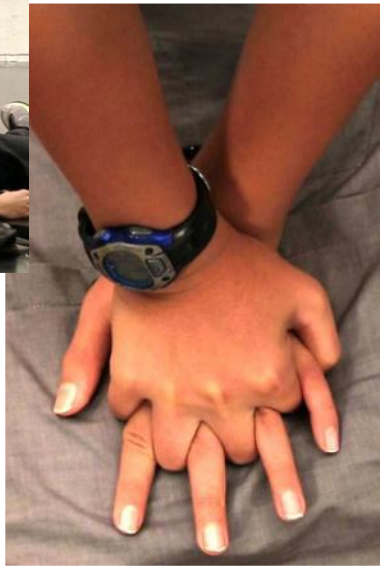
ST PHOTO: DESMOND FOO

HOME B8

LEARN CPR? THEY'RE ALL EARS

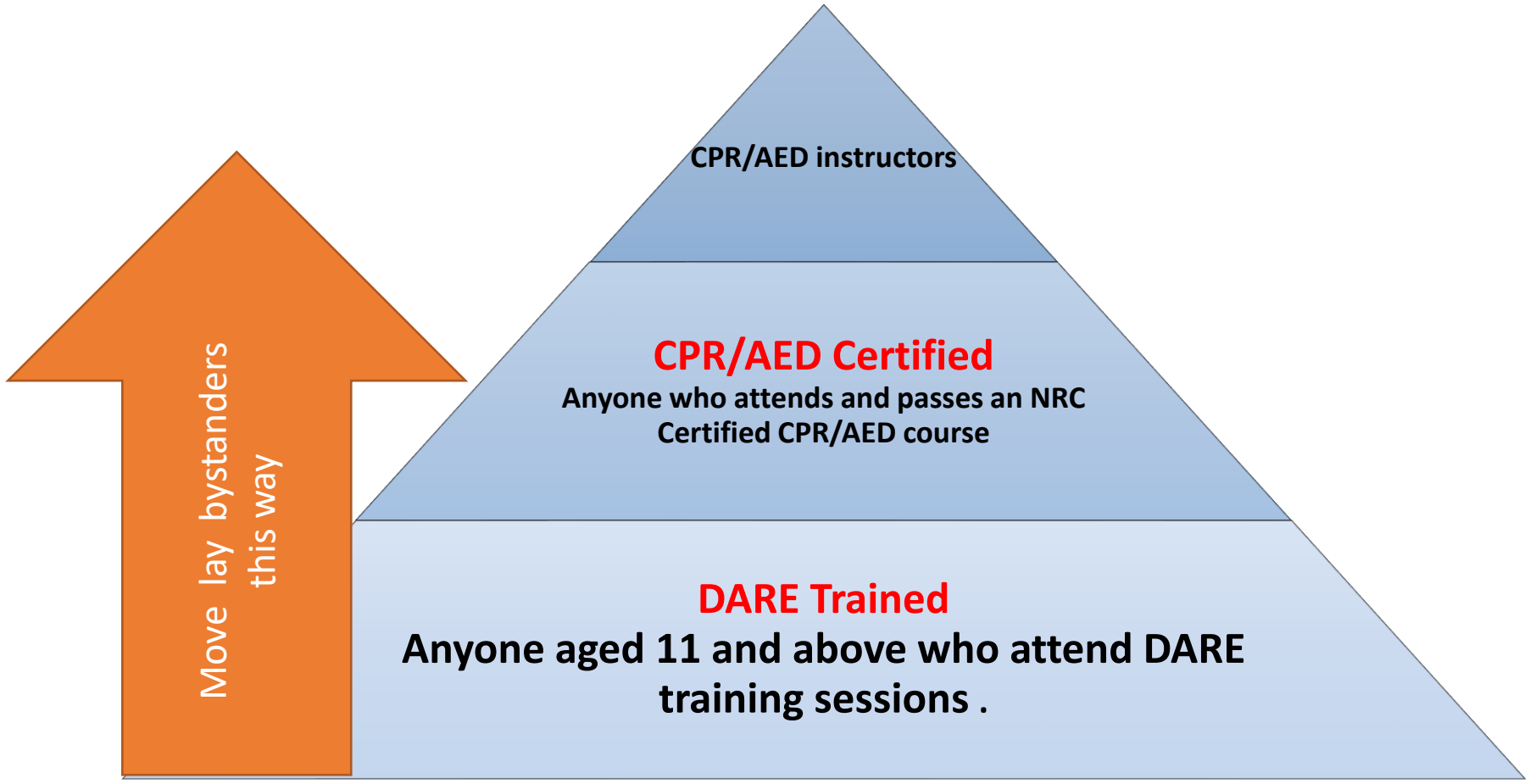
You are never too young to learn how to save lives.

Pupils at St Anthony's Primary School proved just that yesterday when they learnt how to administer cardiopulmonary resuscitation (CPR) and use an automated external defibrillator. About 2,300 students have attended this life-saving programme so far.

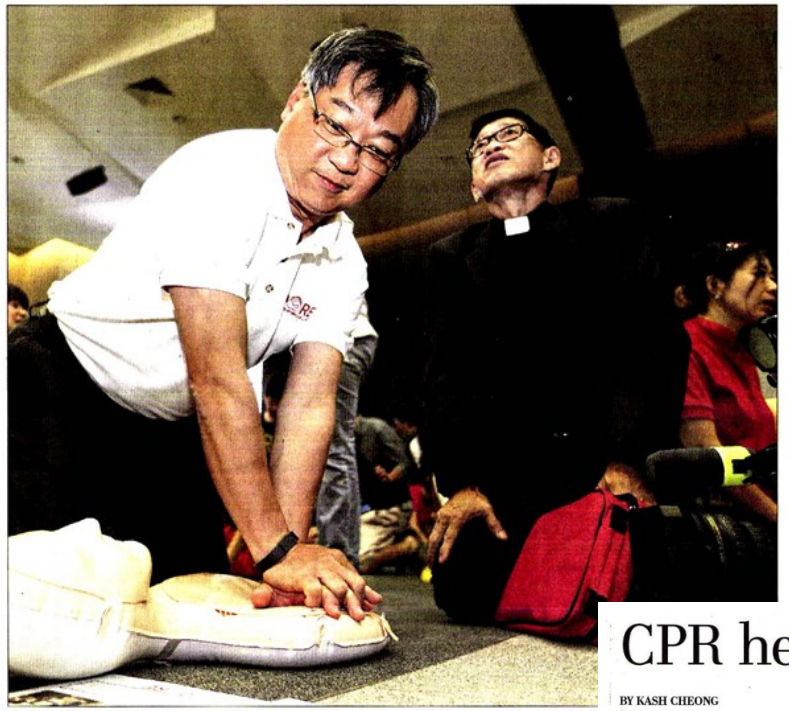


DARE
SAVE A HEART SAVE A LIFE

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 sess 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 ghbours.

"(So) by preparing for the unexted, the skills acquired today y end up saving lives of some- we know or someone we love the future if we dare to step " he said.

amboh@sph.com.sg

CPR helpline a real life-saver

BY KASH CHEONG

MORE 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 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."

kashc@sph.com.sg

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

Singapore General Hospital

Step 9: Accountability

Ministry of Home Affairs	Ministry of Health	Ministry of Education	Ministry of Defence
SCDF CDA & PAD	Hospitals ED, UPEC, NRC, NFAC, IAN	NYP and ITE	SAF, SMTI and Medical Centres
• 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

Research can impact policy!

Pre-hospital Emergency Care

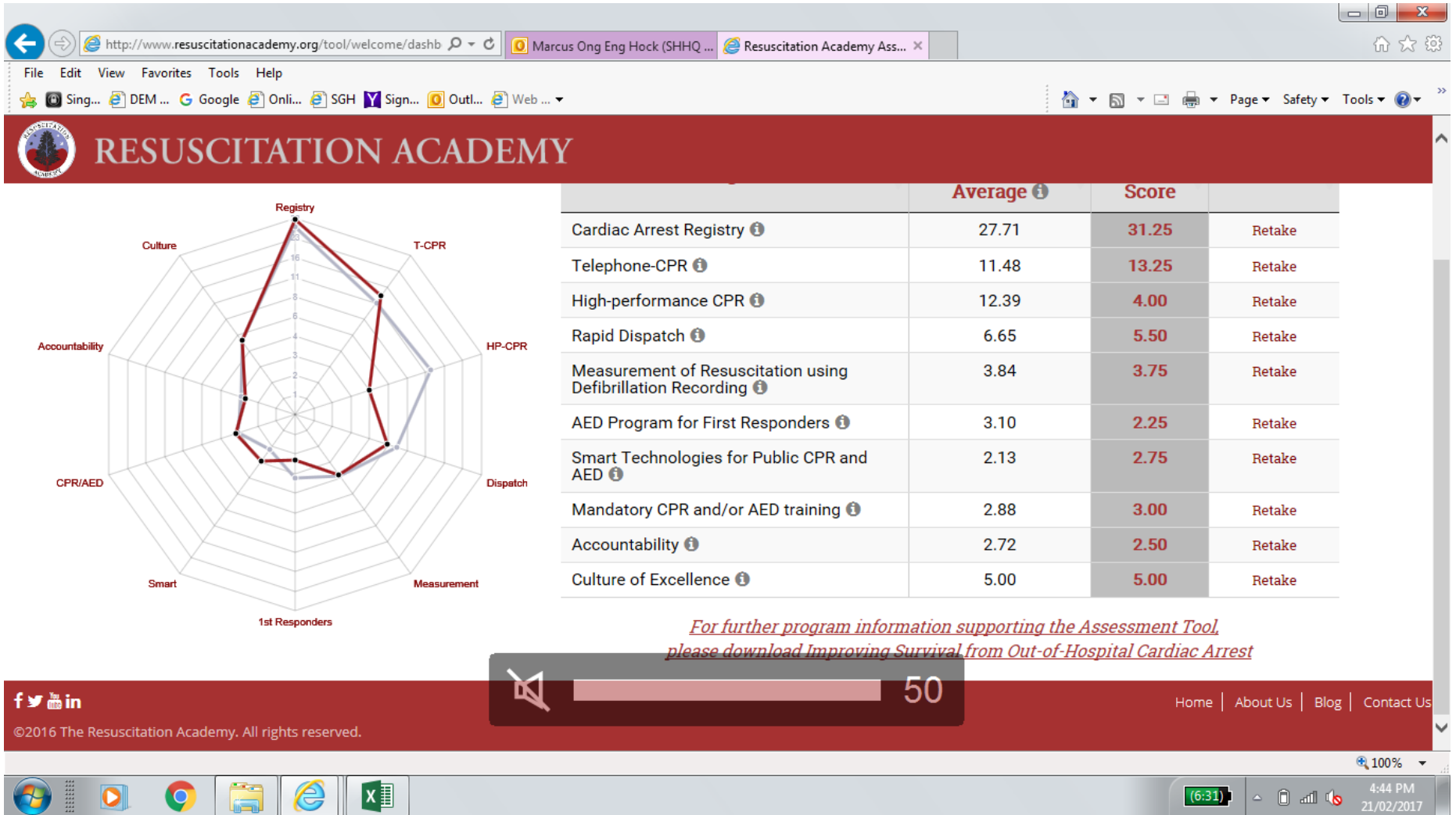
---

5 Year Plan (2011 – 2016)

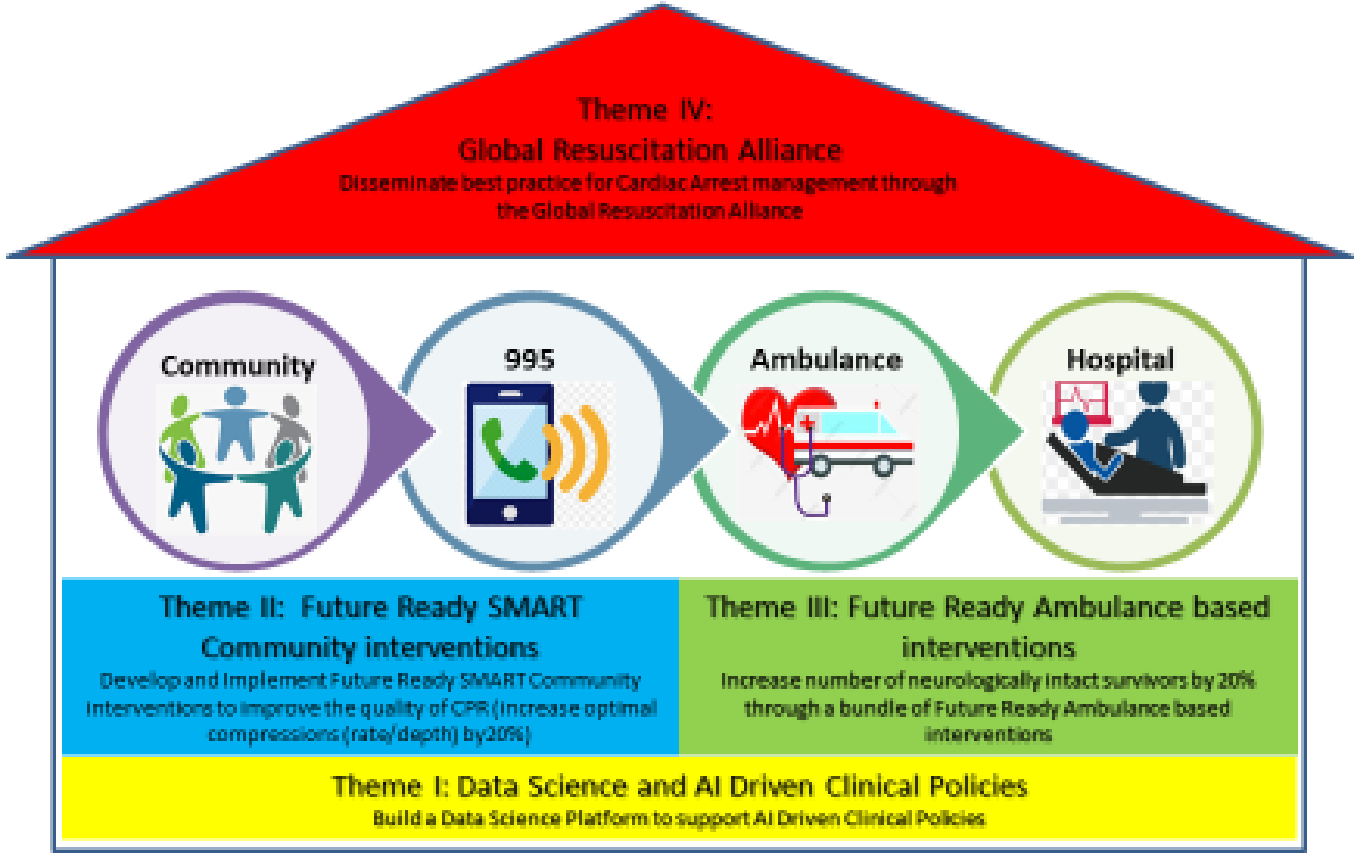
Second 5 Year Plan (2018-2022)

Research can impact outcomes!

Step 10: Culture of Excellence



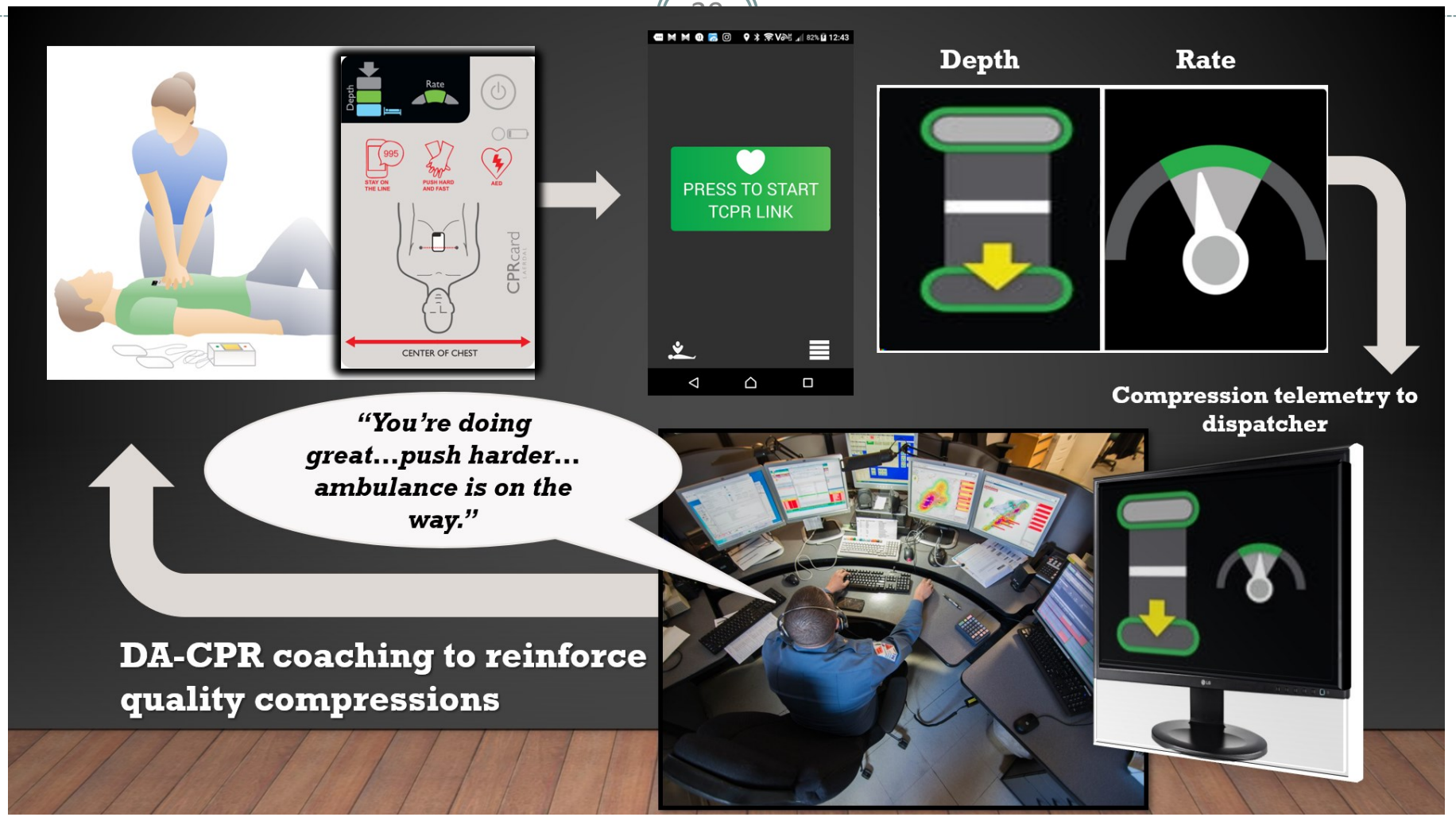
NMRC STaR Proposal: Future-Ready Interventions for Survival after Cardiac Arrest (FRISCA): Quantity to Quality Survivorship



Overall Aim: To increase the number of cardiac arrest survivors with good neurological function by 20% over 5 years

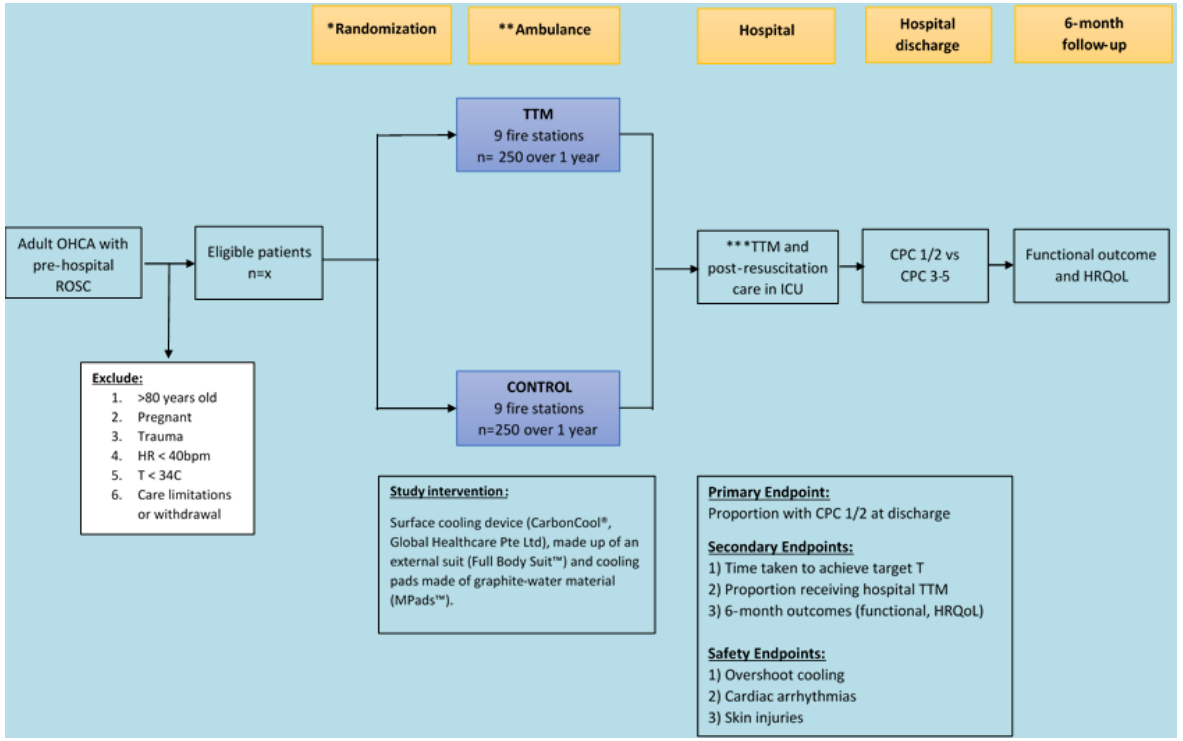
Theme 2: Future Ready SMART Community interventions

Integrated MyResponder / CPR Card



Theme 3a: Prehospital Therapeutic Temperature Management

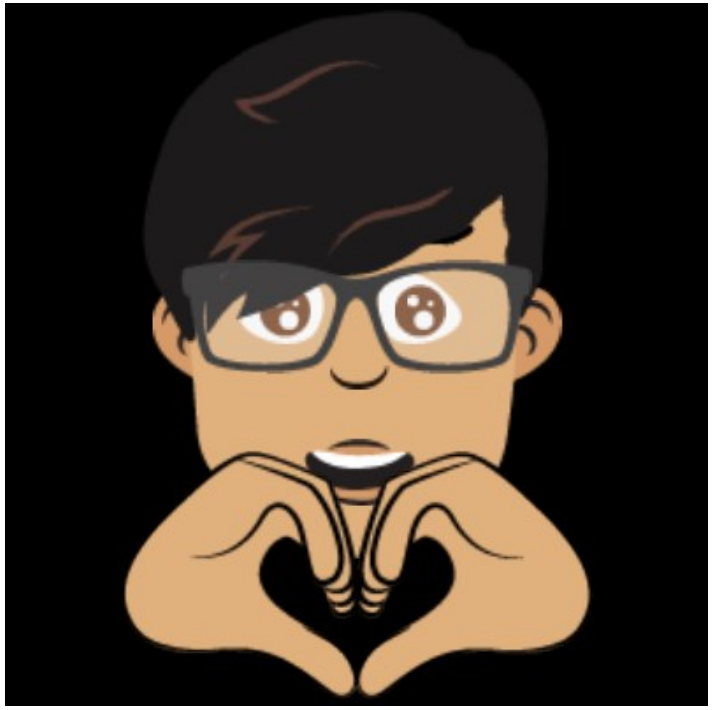
- Targeted temperature management
  - Target population – OHCA with return of pulse in the field
  - Time to target temperature (34C) has been show to impact neurological outcomes
  - Place of cardiac arrest – bring forward to prehospital from the ED
- Method of cooling
  - Novel Carboncool vest Method of Evaluation
  - Real-World Cluster Randomised Clinical Trial



Theme 3b:
Prospective Cluster Randomised Controlled Trial on Heads-Up CPR

- Promising but inconclusive clinical data, backed by convincing preclinical data
- Belief in HUCPR has led to implementations
  ⩾ 2 EMS systems have adopted as standard protocol (Palm Beach County, FL & Rialto, CA)
- Lack of quality clinical data: RCT urgently needed
- Proposed mechanisms
  – ↑ brain blood flow (↓ICP, ↑CerPP)
  – ↑ coronary blood flow
  – ↓ concussive effect of chest compression (speculative)
- Method of Evaluation
  – Real-World Cluster Randomised Clinical Trial

Let's save lives together!



TODAY • MONDAY 12 JUNE 2017

2 hotnews

Card will run users to see if the chest compressions they are giving are deep, fast enough

NEO CHAI CHIN

New device could help save more cardiac arrest victims

Health Minister and Member of Parliament (Chua Chu Kang GRC) Gan Kim Yong practising cardiopulmonary resuscitation using the CPRboard, a new device that gauges the quality of chest compression, at the Chua Chu Kang Health and Sports Carnival. Two hundred residents received the CPRboard yesterday. PHOTO: LIANHE ZAOBAO

SINGAPORE – A new device "that tells you" if a person's hand and weight are enough to push hard and fast enough to save the life of someone in cardiac arrest could improve the survival rate of such patients by ensuring the quality of resuscitation efforts, including an unlucky few who suffer a heart attack while playing sports.

Fitting easily into most wallets or purses, the CPRboard generates a sound with each chest push. Just hook and hold it and "you will hear a 'click' when you're doing cardiopulmonary resuscitation (CPR) on people who are not breathing or stopped pumping blood.

The battery-operated device is placed on the victim's chest before CPR treatment starts. It alerts users as to if the chest compressions they are giving are deep and fast enough to keep the victim's blood flowing.

About 1,000 CPR trainees from private, public and people's sectors, since late last year, to those who participated in Blood Donation First Responder training this month at the House of Tan Tock Seng.

The Health Ministry's Director of Prehospital Emergency Care, Associate Professor Marcus Ong, said: "Each year, more than 1,000 people in Singapore suffer cardiac arrest."

A US$50,000 (S$68,000) research project of the world's first community trial that can be evaluated if the device can save lives, members of the public learn to recognise when a person needs CPR, including chest compressions and have had basic training in CPR.

Under the two-year study, researchers will also look at how many cardiac arrest victims survive to see how they are doing, said Associate Professor Ong.

The CPRboards, a collaboration with Norwegian medical equipment company Laerdal Medical, were given to SCDF, Changi Airport Group and other organisations for training purposes.

Civilians are required to download the mResponder app so they can be alerted by the Singapore Civil Defence Force (SCDF) to nearby cardiac arrest cases nearby, said Associate Professor Ong.

The CPRboards, which can be worn in the armpit for ease of use, are equipped with accompanying apps, allowing the experts to provide users with feedback on how they fared.

The artificial intelligence algorithm also sends graphical feedback after CPR and whether volunteers are being trained correctly.

Data from Electronic Cardiac Response Alert Systems developed by Laerdal Medical, which is also behind the CPRboard, will be used to help improve the device's algorithm.

Mr Gan Kim Yong, who was at the ministry's Health and Sports Carnival yesterday, said the CPRboard will be useful not only for training purposes, but also in real-life situations.

"The CPRboard has a battery life of about two years, which is also the duration of a Basic Life Support certification.

If used continuously, the battery lasts for 30 to 40 minutes, more than enough for the 10 minutes or so that an ambulance takes to arrive.

Researchers want to test if CPRboards in paramedics' ambulances during their shifts will help them perform better.

More than 3,000 cardiac arrests occur out of hospital in Singapore each year, and the rate has increased by between 3 and 5 per cent annually over the past decade, said Associate Professor Ong. At least seven in 10 cases occur at home, while three in four occur in public places.

Only four in 10 out-of-hospital cardiac arrests receive bystander CPR before ambulance services arrive. In some countries, the rate is up to 80 per cent.

According to a 2016 survey, about 60 per cent of the population has received CPR training.

The target is that two to four persons in 10 persons of Singaporeans are to be trained in giving CPR or use the use of automated external defibrillators, said Associate Professor Ong.

"As a bystander, you are afraid of doing something wrong and, even if you do, you are afraid you'll get sued, but the truth is: You aren't do any worse than doing nothing. You do something, the person has a better chance of living."

Health Minister and Member of Parliament Ahmad Maslan (Sembawang GRC) Gan Kim Yong, who was at the ministry's Health and Sports Carnival yesterday, said the CPRboard will be useful not only for training purposes, but also in real-life situations.

With more people trained to use it, the chances of victims surviving cardiac arrest will go up, he said. "To do CPR correctly is also important, to ensure the CPR they administer is effective in saving lives, which is why for the survival of the ambulance and SCDF crew."

ONLY 17, BUT JC STUDENT HAS SAVED MANY LIVES