Bystander CPR and AED... Singapore Style!

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Community CPR and AED is key to survival
We tried to train as many people as possible.

WORLD’S LARGEST CPR TRAINING SESSION

On the first National Life Saving Day organised by Singapore Heart Foundation and National Resuscitation Council (Singapore) at the Singapore Expo, 7,909 participants learned the correct way of saving lives using the hands-only cardiopulmonary resuscitation. The event took place on 16 Jan 2011.

WORLD’S LARGEST AED TRAINING SESSION

On the second National Life Saving Day, 15 Jan 2012, over 2,500 turned up over the two sessions at Singapore Expo to learn how to use the Automated External Defibrillator (AED). The event was organized by the National Resuscitation Council (Singapore) and the Singapore Heart Foundation. As the Guinness record that the organizers applied for, is for largest training session, the first was counted to have 1,708 participants.
Singapore bystander CPR Rates 2001-2011

- Launch of National First Aid Council
- Launch of the national CPR+AED program at SGH
- Deployed first AEDs at Bukit Merah
- National Life Saving Day
- Guinness Book of World Record

20.6% 20.6% 21.6% 21.6% 21.5% 21.5% 21.7% 19.7% 21.8% 22.9% 22.0%
It didn’t work.
Out of Hospital Cardiac Arrest Survival was <2%!

Only 20% of cases get bystander CPR

~1% get bystander defibrillation

bystander CPR 3-5 minutes

EMS CPR + AED 12-15 mins

100% of cases get EMS CPR+AED too late!
### Survival from Cardiac Arrests King County: 2005-2011 Witnessed VF Rhythm

#### Time to first shock

<table>
<thead>
<tr>
<th>Time to CPR</th>
<th>0-6 min</th>
<th>9-12 min</th>
<th>13+ min</th>
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<tbody>
<tr>
<td>0-4 min</td>
<td>64%</td>
<td>41%</td>
<td>30%</td>
</tr>
<tr>
<td>5-8 min</td>
<td>49%</td>
<td>27%</td>
<td>12%</td>
</tr>
<tr>
<td>9+ min</td>
<td>N/A</td>
<td>10%</td>
<td>0%</td>
</tr>
</tbody>
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![Image of AED with 995 logo]
Where could we get the insight?

Recorded 995 calls

Dispatchers and paramedics
focus group interviews
Telephone CPR Training Workshop
Dispatcher Assisted Workshop
Quantitative Evaluations Of Telephone CPR advice
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
• 42.1% did CPR
  • 8.8% were coached
• 34.3% knew CPR
  • 11.9% started after dispatcher identified case
• 22.4% started by themselves

KNOWING ≠ DOING!
Bystander CPR Rates 2001-2016

Tele CPR
MAN SAVES HEART ATTACK VICTIM AFTER GETTING CPR INSTRUCTIONS OVER THE PHONE

TO MARK NATIONAL LIFE SAYING DAY, 23 HEROES WERE RECOGNISED YESTERDAY FOR SAVING PEOPLE SUFFERING FROM CARDIAC ARREST. THREE AWARD RECIPIENTS TELL KRISTAL CHIA (KRYSTALC@SPH.COM.SG) HOW THEY DID IT.

Feb 9, 2014: Restaurant owner Mr Tan Han Theng, 63, had a heart attack in his restaurant.
Dispatcher Assisted first REsponse (DARE) program

Only 80% knew 995 was for ambulances!

Only 18% believed that anyone can use an AED

Only 20% started CPR by themselves
Why is our knowledge of ‘9-9-5’ poor?
Making CPR accessible to everyone (240mins → 40mins)

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.

Health Minister Gan Kim Yong (left) and Reverend Derrick Lau at a simplified CPR training session at the Methodist Church of the Incarnation. The training is being extended to religious organisations and workplaces.
What is special about the DARE program?

Recognizing Agonal Breathing

Teaching Interaction with Dispatch
Teaching Agonal Breathing

• Revamping of Singapore Resuscitation and First Aid Council teaching to include show videos agonal breathing (2018)
Cardiac arrest is a sudden loss of heart function and can happen without any warning. It may be due to a variety of heart conditions, such as the sudden onset of abnormal heart rhythm.

Cardiac arrest can lead to sudden cardiac death if help is not given immediately to the person suffering from it.

The signs and symptoms of cardiac arrest are immediate and drastic. They may include:
- No pulse
- No breathing
- Sudden collapse
- Loss of consciousness

Search for news articles online about someone who had suffered a sudden cardiac arrest but was saved after being given help. Choose an article to share with your class. You may talk about the following:
- The cause of the person who suffered a cardiac arrest
- The location of the incident
- The actions of the person who helped that person.

To improve the chances of surviving a cardiac arrest, the person must receive medical attention as quickly as possible.

If you suspect someone suffered a cardiac arrest, do the following:
1. Seek help from others and call 995 for assistance.
2. Stay on the line and follow the instructions given by the dispatcher. If you are an officer from the Singapore Civil Defence Force.
3. Follow the instructions given by the dispatcher. Perform chest compressions as part of Cardiopulmonary Resuscitation (CPR) and use the Automated External Defibrillator (AED) on the person, until medical services (for example, ambulance) arrive.
4. Do you know where you can find AEDs in your school?
Secondary 1 DARE Program
One-Man CPR in 2015 and 2018

2015 NRC BCLS One-Man CPR Protocol

- Check for Danger
- Check Responsiveness
- Shout "Help", call ambulance, follow dispatcher's instructions, get AED
- *Open Airway* Head tilt, chin lift
- Check Breathing: Look for rise and fall of chest for up to 10 sec
  - If No or not sure:
    - Stop CPR
    - AED arrives and analyses heart rhythm
    - Emergency team takes over CPR
- Expose chest adequately to identify hand position
  - Check Carotid Pulse: For experienced healthcare providers only
  - Definite pulse and normal breathing within 10 sec
- *Optional for lay recovery*
- *Mouth-to-mouth Ventilations* 2 breaths
  - 1 sec per breath
  - Tidal volume 400-600 mL or chest just rises
- Continue until casualty wakes up
  - AED arrives and analyses heart rhythm
  - Emergency team takes over CPR
- NRC recommends:
  - Chest compressions at rate of 100-120 per min for all casualties in cardiac arrest.
  - Those trained, able and willing to give mouth-to-mouth rescue breaths should do so.
  - If tried after 100 chest compressions, the rescuer may take up to 10 sec rest.

2018 Proposed SRFAC BCLS One-Man CPR Protocol

- Check for Danger
- Check Responsiveness
- Shout "Help" Call Ambulance 995, follow dispatcher's instructions
- Get AED if visible and nearby
- Normal Breathing? Look for rise and fall of chest (not more than 10 seconds)
  - Not present or Not Sure
- Expose the chest adequately
  - 30 Chest Compressions
  - Lower half of sternum
  - Depth of 4–6 cm, Rate at 100–120 per min
  - Allow complete chest recoil
  - Open Airway
    - Head-Tilt, Chin-Lift
    - Mouth-To-Mouth Ventilations
    - 2 Breaths
    - 1 second per breath
    - Tidal Volume 400mL-600mL or chest rises
- Stop CPR when:
  - An AED is connected to the casualty and prompts to stop CPR.
  - The ambulance crew arrives and takes over further care of the casualty.
  - The casualty regains normal breathing or consciousness.

2018 SRFAC CPR(Hands-Only) One-Man CPR Protocol

- Check for Danger
- Check Responsiveness
- Shout "Help" Call Ambulance 995, follow dispatcher's instructions
- Get AED if visible and nearby
- Normal Breathing? Look for rise and fall of chest (not more than 10 seconds)
  - Not present or Not Sure
- Expose the chest adequately
  - Provide Continuous Chest Compressions
  - Lower half of sternum
  - Depth of 4–6 cm, Rate at 100–120 per min
  - Allow complete chest recoil
  - If rest is needed, do not exceed 10 seconds (if alone)
- Stop CPR when:
  - An AED is connected to the casualty and prompts to stop CPR.
  - The ambulance crew arrives and takes over further care of the casualty.
  - The casualty regains normal breathing or consciousness.

Remove Head-Tilt, Chin-Lift and change to get AED – HTCL is a delay to the first compressions
Public Access Defibrillation
ORIGINAL RESEARCH

Implications for public access defibrillation placement by non-traumatic out-of-hospital cardiac arrest occurrence in Singapore

Nur Diana ZAKARIA,¹ Marcus Eng Hock ONG,²,³ Han Nee GAN,⁴ David FOO,⁵ Nausheen DOCTOR,² Benjamin Sieu-Hon LEONG,⁶ E Shaun GOH,⁷ Yih Yng NG,⁸ Lai Peng THAM,⁹ Rabind CHARLES,¹⁰ Nur SHAHIDAH,² Papia SULTANA¹¹ and Venkataraman ANANTHARAMAN² for the PAROS study group

¹Yong Loo Lin School of Medicine, National University Health System, Singapore, ²Department of Emergency Medicine, Singapore General Hospital, Singapore, ³Office of Clinical Sciences, Duke-NUS Graduate Medical School, Singapore, ⁴Accident and Emergency Department, Changi General Hospital, Singapore, ⁵Department of Cardiology, Tan Tock Seng Hospital, Singapore, ⁶Emergency Medicine Department, National University Hospital, Singapore, ⁷Department of Acute and Emergency Care, Khoo Teck Puat Hospital, Singapore, ⁸Medical Department, Singapore Civil Defence Force, Singapore, ⁹Children’s Emergency, KK Women’s and Children’s Hospital, Singapore, ¹⁰Emergency Medicine Department, Alexandra Hospital, Singapore, and ¹¹Department of Statistics, University of Rajshahi, Bangladesh
Housing (71.4%)  Vehicles (7.1%)  Medical Facilities (5.9%)  Offices (2.8%)
Shopping Malls (2.4%)  Roadside (2.4%)  Sports Facilities (1.6%)  Community Clubs (1.4%)
Checkpoints (1.0%)  Hotel (1.0%)  Transport (0.9%)  Schools (0.7%)
70% of cardiac arrest cases occur in the 10,000 public housing estates!

1 AED in every 2 blocks
Project Registry for AED Integration (R-AEDi) launched!

By 2017, one would be able to easily locate Automated External Defibrillators (AEDs) for emergency use. With 1,700 Singaporeans suffering from cardiac arrests annually, AED usage can potentially improve survival rates by 11 times! The Registry for AED Integration (R-AEDi) project was officially launched on 25 March 2014 by Singapore Civil Defence Force and Singapore Heart Foundation.

By Charissa Tan

Every year, some 1,700 persons suffer from cardiac arrest in Singapore, with a 2.4 per cent survival rate.

While Cardio Pulmonary Resuscitation (CPR) can potentially improve survival by 2.2 times and public Automated External Defibrillators (AEDs) by 11 times, only 20 per cent of bystanders perform CPR and less than 2 per cent of cardiac arrests are successfully intervened by a public AED.

An AED is a portable device that checks the heart rhythm.

It can also send an electric shock to the heart to try to restore a normal rhythm, in cases of cardiac arrest.
National AED survey 2015 and 2017

- Trained to use AED?
  - 2015: 11%
  - 2017: 18%

- Recognise AED sign?
  - 2015: 67%
  - 2017: 79%
National AED survey 2015 and 2017

- Anyone can use an AED: 18% (2015) vs 35% (2017)
- I'm confident to use an AED: 30% (2015) vs 79% (2017)
Singapore Heart Foundation staff checking AED maintenance and adding decals
15 brands of PADs
2 dominant players
5 smaller players
Represent 99% of the market
AEDs registered and AEDs that need maintenance in Singapore 2015-2018

- AEDs registered:
  - 2015: 2252
  - 2016: 3861
  - 2017: 7018
  - 2018: 8806

- Spoilt AEDs:
  - 2015: 289
  - 2016: 71
  - 2017: 47
  - 2018: 80

- Spoilt AEDs (%):
  - 2015: 12.8%
  - 2016: 1.8%
  - 2017: 0.7%
  - 2018: 0.9%
Registration Process

Provide an AED guidebook for AED owners to address commonly asked questions about AEDs and related matters.
Bystander CPR, AED usage rates and OHCA survival 2011-2016 in Singapore

- Bystander CPR: 2.5x ↑
- AED: 2.6x ↑
- Utstein: 2.0x ↑

<table>
<thead>
<tr>
<th>Year</th>
<th>Bystander CPR</th>
<th>Bystander AED usage</th>
<th>Utstein Survival Rates</th>
<th>Total Survivors</th>
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<tbody>
<tr>
<td>2011</td>
<td>22.0%</td>
<td>1.8%</td>
<td>11.6%</td>
<td>48</td>
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<tr>
<td>2012</td>
<td>32.9%</td>
<td>1.9%</td>
<td>13.4%</td>
<td>53</td>
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<td>2.5%</td>
<td>15.2%</td>
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<td>50.7%</td>
<td>3.6%</td>
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<td>2016</td>
<td>56.4%</td>
<td>4.6%</td>
<td>23.4%</td>
<td>163</td>
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Questions?

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