Video-only CPR education for cardiac patient’s families before hospital discharge

Audrey L. Blewer, MPH
Assistant Director for Education Programs
Center for Resuscitation Science
Department of Emergency Medicine
University of Pennsylvania
Disclosure

AHA, Mentored Clinical and Population Research grant (PI: Blewer)

NIH R18 grant, HL107217 (PI: Abella)
Low bystander CPR rates

Few cardiac arrest victims receive layperson CPR

There is a striking difference between private / public location

Home/private: 26%

Public: 45%

Weisfeldt et al, NEJM 2011
Low bystander CPR rates: major public health problem

AHA Scientific Statement

Reducing Barriers for Implementation of Bystander- Initiated Cardiopulmonary Resuscitation

A Scientific Statement From the American Heart Association for Healthcare Providers, Policymakers, and Community Leaders Regarding the Effectiveness of Cardiopulmonary Resuscitation

Benjamin S. Abella, MD, MPh; Tom P. Aufderheide, MD, FAHA; Brian Eigl, PhD; Robert W. Hickey, MD, FAHA; W.T. Longstreth, Jr, MD, FAHA; Vinay Nadkarni, MD, FAHA; Graham Nichol, MD, FAHA; Michael R. Sayre, MD; Claire E. Sommargren, RN, PhD, FAHA; Mary Fran Hazinski, RN, MSN, FAHA

Abella et al, Circulation 2008

AHA Science Advisory

Increasing Cardiopulmonary Resuscitation Provision in Communities With Low Bystander Cardiopulmonary Resuscitation Rates

A Science Advisory From the American Heart Association for Healthcare Providers, Policymakers, Public Health Departments, and Community Leaders

Comilla Sasson, MD, MS, Chair; Hendrika Meischke, PhD; Benjamin S. Abella, MD, MPH, FAHA; Robert A. Berg, MD, FAHA; Bentley J. Bobrow, MD; Paul S. Chan, MD, MSc; Elisabeth Dowling Root, PhD; Michele Heisler, MD, MPH, Jerrold H. Levy, MD, FAHA; Mark Link, MD; Frederick Masoudi, MD, MPH, FAHA; Marcus Ong, MD; Michael R. Sayre, MD, FAHA; John S. Rumsfeld, MD, PhD, FAHA; Thomas D. Rea, MD, MPH, Co-Chair; on behalf of the American Heart

Sasson et al, Circulation, 2013

Low bystander CPR rates
And mismatch of training
Important barriers to obtaining training
Large socioeconomic and racial disparities in CPR Training (and arrest survival)

Both called for innovative approaches to increase CPR training of the public
Education

Despite significant scientific advances in the care of cardiac arrest victims, there remains considerable variability in survival rates that cannot be attributed to patient characteristics alone. To optimize the likelihood that cardiac arrest victims receive the highest-quality evidence-based care, resuscitation education must use sound educational principles supported by empirical educational research to translate scientific knowledge into practice. While the 2010 AHA education guidelines included implementation and teams in its recommendations, the 2015 AHA education guidelines now focus strictly on education, with implementation and teams being included in other parts of the 2015 Guidelines Update.

Targeted Training

2015 (New): Training primary caregivers and/or family members of high-risk patients may be reasonable.

Why: Studies consistently show high scores for CPR performance by trained family members and/or caregivers of high-risk cardiac patients as compared with those who were untrained.
Hospital wait time

Families waiting for their loved one in the hospital – a captive moment to learn a lifesaving skill?
Penn’s hospital-based CPR training program

BRIEF REPORT

Cardiopulmonary Resuscitation Training of Family Members Before Hospital Discharge Using Video Self-Instruction: A Feasibility Trial

Audrey L. Blewer, MPH
Marion Leary, BSN, RN
Christopher S. Decker, BS
James C. Andersen, BA
Amanda C. Fredericks, BA
Bentley J. Bobrow, MD
Benjamin S. Abella, MD MPH

1 Center for Resuscitation Science and Department of Emergency Medicine, University of Pennsylvania, Philadelphia, Pennsylvania.

2 Emergency Medicine Department, Maricopa Medical Center, Phoenix, Arizona.

3 Department of Medicine, Division of Pulmonary, Allergy and Critical Care, University of Pennsylvania, Philadelphia, Pennsylvania.

Blewer et al, J Hosp Med 2011
CPR training instrument

- AHA/Laerdal collaboration
- Video Self Instruction (VSI)
- < 30 minutes
- Emphasis on hands-on practice time
- Validated

**DVD teaches Hands-only CPR (AHA 2010 Guidelines)**
Video-only Education

What is the minimum amount of training required?

Big public health implications if no manikin required...
Eight hospital program: February 2012 – current

Family and Friends CPR Training Study

- **HUP**
  - Launched: 2/28/12
  - Volunteer model

- **PMC**
  - Launched: 2/2/12
  - Nurse model

- **PAH**
  - Launched: 3/6/12
  - Volunteer/nurse hybrid

- **Crozer-Chester**
  - Launched: 3/5/12
  - Nurse model

- **Einstein**
  - Launched: 5/3/12
  - RN/RA model

- **Temple**
  - Launch: 9/27/2012
  - Nurse model

- **Chester County**
  - Launched: 9/24/2012
  - Nurse model

- **Taylor Hospital**
  - Launch: TBD

ENROLLMENT SITES

Cardiac step-down units, telemetry units, intermediate care units, or observation units
Who offers the training?

CPR instruction was offered to family members of hospitalized cardiac patients by volunteers (staff nurses and students in the health sciences)
### Who offers the training?

<table>
<thead>
<tr>
<th>Category</th>
<th>Nurse N=167</th>
<th>Student N=93</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>39±17</td>
<td>20±12</td>
</tr>
<tr>
<td>Gender- Female</td>
<td>89%</td>
<td>63%</td>
</tr>
<tr>
<td>Classification- Bedside nurse</td>
<td>90%</td>
<td></td>
</tr>
<tr>
<td>Nurse Educator</td>
<td>5%</td>
<td></td>
</tr>
<tr>
<td>Other Nursing Profession</td>
<td>5%</td>
<td></td>
</tr>
<tr>
<td>Pre-med/Pre-health</td>
<td></td>
<td>85%</td>
</tr>
<tr>
<td>EMTs</td>
<td></td>
<td>12%</td>
</tr>
<tr>
<td>Other student</td>
<td></td>
<td>3%</td>
</tr>
</tbody>
</table>
How are the volunteers recruited?

Nursing personnel were identified by nurse educators, clinical nurse specialists, and nurse managers at participating hospitals.
How are the volunteers recruited?

Students were recruited using pre-medical and pre-health email lists and were screened by study staff through in-person interviews.

Current Project: We offer CPR training on the Cardiac Intermediate Care Unit at the Hospital of the University of Pennsylvania, where volunteers, who are trained but not certified to teach CPR, offer CPR training to family members of eligible patients. Through this targeted training program, many family members of “at risk” patients learned the life-saving skill of CPR.

The goal of the current program is to develop a more sustainable CPR training model by using resources within the hospital, such as volunteers, to offer the life-saving skill of CPR to family members of patients with cardiovascular risk factors.

CPR Training Process: The CPR training can take place anywhere it is convenient- if there is enough space, you can train the individual in the patient’s room, or you may take the family member to a nearby family waiting room or conference room. The volunteers will just wheel the cart and equipment into the room of choice and follow a simple four-step process! This is fun, easy and could save a life! **FUN, EASY, and could save a life!**

Questions - please contact the Project Manager: Audrey L. Blewer, MPH at [Audrey.blewer@uphs.upenn.edu](mailto:Audrey.blewer@uphs.upenn.edu)

Principal Investigator: Benjamin S. Abella, MD, MPhil

Project Manager: Audrey L. Blewer, MPH

Primary Study Site: Center for Resuscitation Science, Hospital of the University of Pennsylvania, Philadelphia, PA 19104
How are the volunteers trained?

Identify and approach a potential family members

Set up the training materials

Mock enrollment scenarios

Shadow “senior volunteers”
Nurses periodically approached potential family members and offered them the opportunity to learn CPR before their loved one was discharged.

Students were scheduled under a shift-work model and were asked to take at least one two-hour shift per week.
Research objective

To compare video-only CPR training without a manikin to standard training with a manikin

Outcome: chest compression rate and depth at 6 months
Research methods

- Hospitals were block randomized to offering VSI or video-only CPR training.
- At 6 months post-training, subjects were asked to complete a brief in-person interview.
- Upon completion of the interview, the subject was asked to perform a two-minute CPR skills test on a CPR-recording manikin.
Results: Study enrollment from 02/2012-05/2015

1610 Randomized

770 Video-only
- 507 excluded:
  - 349 misc. loss to follow-up
  - 45 no skills check
  - 113 declined follow-up

263 Completed follow-up

840 VSI
- 532 excluded:
  - 387 misc. loss to follow-up
  - 40 no skills check
  - 105 declined follow-up

308 Completed follow-up
### Results: Study demographics

<table>
<thead>
<tr>
<th></th>
<th>Initial enrollment Video-only n=770</th>
<th>VSI n=840</th>
<th>p-value</th>
<th>Six month skills assessment Video-only n=263</th>
<th>VSI n=308</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age</strong></td>
<td>52 ± 15</td>
<td>52 ± 15</td>
<td>0.93</td>
<td>52 ± 14</td>
<td>51 ± 14</td>
<td>0.26</td>
</tr>
<tr>
<td><strong>Race, n(%)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>White</td>
<td>442 (58)</td>
<td>457 (55)</td>
<td>0.33</td>
<td>137 (53)</td>
<td>167 (54)</td>
<td>0.94</td>
</tr>
<tr>
<td>Black</td>
<td>248 (33)</td>
<td>290 (35)</td>
<td></td>
<td>102 (40)</td>
<td>117 (38)</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>69 (9)</td>
<td>88 (10)</td>
<td></td>
<td>19 (7)</td>
<td>23 (8)</td>
<td></td>
</tr>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Female</td>
<td>547 (73)</td>
<td>609 (73)</td>
<td>0.87</td>
<td>192 (74)</td>
<td>232 (75)</td>
<td>0.74</td>
</tr>
<tr>
<td>Male</td>
<td>223 (27)</td>
<td>225 (27)</td>
<td></td>
<td>67 (26)</td>
<td>76 (25)</td>
<td></td>
</tr>
<tr>
<td><strong>Relationship</strong></td>
<td></td>
<td></td>
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<tr>
<td>Spouse</td>
<td>253 (33)</td>
<td>276 (33)</td>
<td>0.36</td>
<td>91 (35)</td>
<td>109 (36)</td>
<td>0.81</td>
</tr>
<tr>
<td>Immediate Family</td>
<td>369 (49)</td>
<td>382 (46)</td>
<td></td>
<td>120 (46)</td>
<td>132 (43)</td>
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<tr>
<td>Other</td>
<td>135 (18)</td>
<td>170 (21)</td>
<td></td>
<td>50 (19)</td>
<td>63 (21)</td>
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## Results; Demographics, continued

<table>
<thead>
<tr>
<th>Education</th>
<th>Initial enrollment</th>
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<th>Six month skills assessment</th>
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<tbody>
<tr>
<td></td>
<td>Video-only</td>
<td>VSI</td>
<td>p-value</td>
<td>Video-only</td>
<td>VSI</td>
</tr>
<tr>
<td></td>
<td>n=770</td>
<td>n=840</td>
<td></td>
<td>n=263</td>
<td>n=308</td>
</tr>
<tr>
<td>High School</td>
<td>281 (37)</td>
<td>318 (38)</td>
<td>0.69</td>
<td>91 (35)</td>
<td>107 (35)</td>
</tr>
<tr>
<td>Some College</td>
<td>182 (24)</td>
<td>204 (24)</td>
<td></td>
<td>61 (23)</td>
<td>80 (26)</td>
</tr>
<tr>
<td>College</td>
<td>203 (27)</td>
<td>202 (24)</td>
<td></td>
<td>75 (29)</td>
<td>74 (24)</td>
</tr>
<tr>
<td>Graduate School</td>
<td>95 (12)</td>
<td>113 (14)</td>
<td></td>
<td>35 (13)</td>
<td>47 (15)</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Previous Training</th>
<th>Initial enrollment</th>
<th></th>
<th></th>
<th>Six month skills assessment</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Video-only</td>
<td>VSI</td>
<td>p-value</td>
<td>Video-only</td>
<td>VSI</td>
</tr>
<tr>
<td></td>
<td>n=770</td>
<td>n=840</td>
<td></td>
<td>n=263</td>
<td>n=308</td>
</tr>
<tr>
<td>Never</td>
<td>361 (47)</td>
<td>429 (52)</td>
<td>0.17</td>
<td>122 (47)</td>
<td>144 (47)</td>
</tr>
<tr>
<td>&lt;2 years</td>
<td>63 (8)</td>
<td>60 (7)</td>
<td></td>
<td>19 (7)</td>
<td>31 (10)</td>
</tr>
<tr>
<td>2-5 years</td>
<td>108 (14)</td>
<td>89 (11)</td>
<td></td>
<td>37 (14)</td>
<td>34 (11)</td>
</tr>
<tr>
<td>6-10 years</td>
<td>77 (10)</td>
<td>76 (9)</td>
<td></td>
<td>32 (12)</td>
<td>26 (8)</td>
</tr>
<tr>
<td>&gt;10 years</td>
<td>158 (21)</td>
<td>181 (21)</td>
<td></td>
<td>52 (20)</td>
<td>72 (24)</td>
</tr>
</tbody>
</table>
## Results: CPR skills at 6 month follow-up

<table>
<thead>
<tr>
<th></th>
<th>Video-only n=263</th>
<th>VSI n=308</th>
<th>Adjusted Difference†</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>CC Rate (n/min)</td>
<td>88 (85, 90)</td>
<td>89 (87, 91)</td>
<td>1 (-3, 4)</td>
<td>0.76</td>
</tr>
<tr>
<td>CC Depth (mm)</td>
<td>40 (39, 42)</td>
<td>45 (44, 47)</td>
<td>5 (3, 7)</td>
<td>&lt;0.01</td>
</tr>
</tbody>
</table>

Mean Chest Compression (CC); † propensity score adjusted with all of the demographics in Table 1.
Discussion

• To our knowledge, this represents the largest prospective trial of long-term retention after CPR training among lay providers

• Video-only training yielded a statistically indistinguishable difference in chest compression rate compared to VSI training

• Mean chest compression depth was significantly lower in the video-only group
The trade off: does this difference in depth matter?

Video-only

Pro: broad dissemination
Con: shallower CC depth

VSI

Pro: deeper CC depth
Con: narrower reach

Compression depth by in-hospital providers:
Mean depth < 45 mm

Compression depth by out-of-hospital providers:
Mean depth <45 mm

Is this a case where perfect is the enemy of good?
The video-only education platform opens new possibilities for innovative training of the public – reaching an enormous audience:

- Driver’s license registration
- Airplane safety videos
- Train stations or airports
- Gas station video consoles
Acknowledgements

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Shaun McGovern, EMT-B
Andrew Murray, EMT-B
Spring 2012, one of our first year pre-med students trained a wife of a patient in the Hospital of the University of Pennsylvania.

In September of 2012, the patient suffered a cardiac arrest at home and the wife performed CPR until EMS arrived and transferred him to the nearest hospital.

He is alive and well today because of the early, effective bystander CPR and CPR training his loved one received while in the hospital.

20 people have used the skills they learned through this project.