Telephone CPR: Compressing the Time to First Compression
Why T-CPR?
Study: King County, Wa.

Dispatcher-Assisted Cardiopulmonary Resuscitation and Survival in Cardiac Arrest

Thomas D. Rea, MD, MPH; Mickey S. Eisenberg, MD, PhD; Linda L. Culley, BA; Linda Becker, MA

Background—Early cardiopulmonary resuscitation (CPR) improves survival in out-of-hospital cardiac arrest, and dispatcher-delivered instruction in CPR can increase the proportion of arrest victims who receive bystander CPR before emergency medical service (EMS) arrival. However, little is known about the survival effectiveness of dispatcher-delivered telephone CPR instruction.

Methods and Results—We evaluated a population-based cohort of EMS-attended adult cardiac arrests (n=7265) from 1983 through 2000 in King County, Washington, to assess the association between survival to hospital discharge and 3 distinct CPR groups: no bystander CPR before EMS arrival (no bystander CPR), bystander CPR before EMS arrival requiring dispatcher instruction (dispatcher-assisted bystander CPR), and bystander CPR before EMS arrival not requiring dispatcher instruction (bystander CPR without dispatcher assistance). In this cohort, 44.1% received no bystander CPR before EMS arrival, 25.7% received dispatcher-assisted bystander CPR, and 30.2% received bystander CPR without dispatcher assistance. Overall survival was 15.3%. Using no bystander CPR as the reference group, the multivariate adjusted odds ratio of survival was 1.45 (95% confidence interval [CI], 1.21, 1.73) for dispatcher-assisted bystander CPR and 1.69 (95% CI, 1.42, 2.01) for bystander CPR without dispatcher assistance.
A Dismal Reality

8 %
The Race is On …

Chances of survival decrease 7-10% for every minute without CPR

Nagao Current Opinion in Critical Care 2009
A Case-Level View

Typical Urban EMS Response Timeline in Minutes

<table>
<thead>
<tr>
<th>Event</th>
<th>Time (Minutes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PSAP 1</td>
<td>:26</td>
</tr>
<tr>
<td>Handling</td>
<td>2:29</td>
</tr>
<tr>
<td>Turnout</td>
<td>3:59</td>
</tr>
<tr>
<td>Travel</td>
<td>9:28</td>
</tr>
<tr>
<td>To patient</td>
<td>10:28-11:28</td>
</tr>
<tr>
<td>First shock</td>
<td>11:28-11:38</td>
</tr>
</tbody>
</table>

Why T-CPR?
The OR for Bystander CPR was **2.44** (95% CI, 1.69-3.19)

(Sasson et. al. Circulation: Cardiovascular Quality and Outcomes Nov. 2009.)
The Anchor Link in Chain of Survival

- Quality Dispatcher Assisted CPR
- Quality Pro CPR
- Quality Post Resuscitation Care
Quality Improvement Program

Six key process measures:

1. % cases arrest recognized
2. % cases CPR instructions started
3. % cases compressions started
4. Time to recognition
5. Time to start of CPR instructions
6. Time to first bystander compression
## Patient

<table>
<thead>
<tr>
<th>Patient Age (Numeric/C/Child, Adult)</th>
<th>Conscious</th>
<th>Breathing Normally?</th>
<th>Agonals Heard?</th>
<th>Timestamp</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient Age (Numeric/C/Child, Adult)</td>
<td>Not Applicable</td>
<td>Not Applicable</td>
<td>Not Applicable</td>
<td>NA</td>
</tr>
</tbody>
</table>

### Agonals Described

- [ ] Not Applicable
- [ ] T

### Agonals Description

- [ ] Gasping
- [ ] Groaning
- [ ] Gurgling
- [ ] Heavy
- [ ] Labored
- [ ] Meaningless

### Other Agonals Description

- [ ] Not Applicable

### Patient Status Change

- [ ] Not Applicable

## Time Measures

<table>
<thead>
<tr>
<th>Timestamp Q1 Recognized need for CPR</th>
<th>Timestamp dispatched requested patient be placed on back</th>
<th>Timestamp dispatched recognized need for CPR</th>
<th>Timestamp Dispatcher began instructions</th>
<th>Timestamp to first compressions</th>
</tr>
</thead>
<tbody>
<tr>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Timestamp to first rescue breaths</th>
<th>If Secondary Breathing Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>NA</td>
<td>NA</td>
</tr>
</tbody>
</table>

## Barriers to CPR

If CPR

- [ ] Was Delayed
- [ ] Not Given

- [ ] Caller left the phone
- [ ] Caller not with patient
- [ ] CPR already in progress
- [ ] Patient's status changed
- [ ] Refused CPR instructions

Why were CPR instructions refused

- [ ] NA
- [ ] Afraid to hurt patient
- [ ] Didn't think CPR was needed
- [ ] DNR
- [ ] Trained rescuer was present
- [ ] CPR already in progress

- [ ] Dangerous Environment
- [ ] Unable to calm caller
- [ ] Difficult access to patient
- [ ] Language line used
- [ ] Language Barrier
- [ ] Language was:

- [ ] Unlikely to get patient to hard, flat surface
- [ ] Caller physically unable to perform CPR
- [ ] Caller hung up phone
- [ ] Other

Other, explain:

- [ ] Other, explain:
Breakdown of Total Calls

Total calls
n=186

Excluded from SHARE analysis
n=38

SHARE and dispatch recognized need for CPR
n=145

SHARE recognized need for CPR but dispatch did not
n=3

CPR instructions started
n=70

CPR Instructions not started
n=75

Neither compressions nor ventilations delivered
n=13

Compressions only were delivered
n=52

Compressions and ventilations were delivered
n=4

Ventilations only were delivered
n=1
Protocol

- Implemented AHA guideline-based protocols:
  - Focus on 2-Question Model
    - Is the patient conscious?
    - Is the patient breathing normally?
  
  - Emphasis on early ID of gasping, being assertive, and starting CPR as early as possible.

AHA Scientific Statement

Emergency Medical Service Dispatch Cardiopulmonary Resuscitation Prearrival Instructions to Improve Survival From Out-of-Hospital Cardiac Arrest

A Scientific Statement From the American Heart Association
Three-month survival was 5% when a cardiac arrest was not recognized versus 14% when it was recognized.
Signs of Cardiac Arrest

- Sudden, unexpected collapse
- Unconsciousness, **NO** sign of life
- Abnormal breathing (*gasperg*) common
- Brief seizure - lack of oxygen to brain
Taking the Lead: Controlling the Call

• Active Listening: The First Seconds
  - Caller often volunteers 2/3 of critical information

• Callers are often frantic
  - Be ASSERTIVE
  - Be CALM

• Tell them help is on the way

• Get and use caller’s name
  - Establishes trust
Taking the Lead: The Right Approach – AHA’s Two Question Model

• Is the patient conscious?
  • If necessary, ask if “responsive” or “awake”
  • If necessary, ask to speak to patient

• Is the patient breathing **NORMALLY?**
  • Allows you to catch agonal breathing

• If “no” to both, start CPR instructions\(^1,2\)
  • Be assertive: Don’t ask – **TELL**
  • “You need to do CPR, I will help you”
What to Avoid

• Extra questions which *delay* the identification of cardiac arrest and initiation of CPR
Taking the Lead in Identifying Cardiac Arrest Over the Phone: A Summary

• Be calm & assertive to control the call

• Identify cardiac arrest using 2-question model

• Provide appropriate Compression-Only CPR instructions for adults

• Start CPR as early as possible
  • Goal within 2 minutes of call receipt
What is agonal breathing?

• Agonal breathing is an abnormal pattern of breathing characterized by shallow, slow (3-4 per minute), irregular inspirations followed by irregular pauses. They may also be characterized as grasping, labored breathing, accompanied by strange vocalizations and myoclonus.

• The cause for agonal breathing is due to cerebral ischemia, due to extreme hypoxia or even anoxia.
How common is agonal breathing?

- 40% (196/445) Dispatch records
- 55% of witnessed cases
  - Clark Ann Emerg Med 1992

- 39% (44/113) Witnessed and unwitnessed, dispatch text files

- After EMS arrival, n=1218:
  - < 7 min. 20% (73/363)
  - 7-9 min. 14% (50/360)
  - > 9 min. 7 % (25/338)
    - Bobrow Circulation 2008

- 38% (38/100) Dispatch records
  - Bång Resusc 2003
Survival

- The presence of agonal breathing indicates a more favorable prognosis than in cases of cardiac arrest without agonal breathing:

- 27% of patients with agonal breathing were discharged alive compared with 9% without them (p<.001)
  - Clark Ann Emerg Med 1992

- 28% vs 8% (adjusted OR 3.4 95% CI 2.2, 5.2)
  - Bobrow Circ 2008
How does it present in emergency calls?

• Audible examples
• Description: "he’s making noises" ... "humming ... like a humming sound"
• Description: "he’s gasping for air"
• Description: "he’s snoring like he’s in a deep sleep"
• Descriptor: "she’s moaning"
• Descriptor: "she’s groaning"
Conclusion

• Agonal breathing is a positive prognostic sign and is associated with patient survival

• Agonal breathing has different manifestations but is always NOT NORMAL
<table>
<thead>
<tr>
<th></th>
<th><strong>BARRIER</strong></th>
<th><strong>TACTIC</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Bystander panicked, making CPR instruction problematic</td>
<td>Use confidence and assertiveness to take control of the situation</td>
</tr>
<tr>
<td>2</td>
<td>Bystander squeamish about M-T-M contact</td>
<td>Provide compression-only instructions</td>
</tr>
<tr>
<td>3</td>
<td>Bystander fears legal ramification</td>
<td>Assure bystander of Good Samaritan laws safeguarding citizen action</td>
</tr>
<tr>
<td>4</td>
<td>Bystander fearful of hurting the patient in getting them to the floor.</td>
<td><strong>TELL</strong> bystander he <strong>MUST</strong> Engage help if multiple rescuers present. Use pillows.</td>
</tr>
<tr>
<td>5</td>
<td>Bystander fears CPR will hurt patient</td>
<td>Assure bystander that CPR is safe and won’t hurt patient</td>
</tr>
</tbody>
</table>
Barrier: Bystander Panic

• Bystander panic, which could well be expected in the cardiac arrest of a family member, was identified as the most frequent reason for CPR nonprovision.

  * Swor et al. Acad Emerg Med 2006

• High stress and panicked situations can lead to a breakdown in communication between dispatch and bystander.
Tactic: Use Confident Assertiveness

• 75 % of recently-trained bystanders stated that instructions from a dispatcher would make it easier for them to start CPR.

  * Axelsson et al. Resuscitation 2000

• The dispatcher’s stern confidence in the situation becomes the bystander’s confidence when coached assertively.

• Assertiveness is key!
Barrier: Squeamish about M-T-M CPR

• Bystanders often hesitate or are resistant when confronted with the idea of performing CPR with mouth-to-mouth breathing.

• Without clear verbal specification of chest compression-only CPR, it’s reasonable to believe bystanders will think M-T-M when you say CPR.
Tactic: Compression-Only

• Instruct Compression-Only
  • Use key phrases like:
    • “No Mouth-to-Mouth”
    • “No Breaths”
    • “Only Chest Compressions”
  • Tell the bystander that the patient needs chest compressions
  • Or... just begin step-by-step compression-only instructions
Barrier: Getting the Patient to the Floor

• In more than 40% of calls where there is a barrier to starting CPR, the barrier is that the caller can’t get the patient to the floor.

• Most frequently the patient needs to be moved from the bed to floor.
Tactic: Emphasize the emergency situation.

• Assert that no injury to the patient is comparable or relevant when facing a suspected cardiac arrest.

• Instruct the help of other bystanders around.

• When encountering a barrier, bystanders are 3.4 times more likely to overcome the barrier and start compressions when there are multiple bystanders present (95% OR CI: 2.01, 5.67).

• **Tell** the bystander to push, pull, tug, or roll the patient to a hard, flat surface.
Getting the patient to the floor

Pillow Method:

1. Put pillow on floor where available
2. Bring patient’s legs to floor
3. Bring patient’s head down onto pillow
Barrier: Fearful of CPR hurting the patient

• Thoughts of harming the patient can instill fear in the rescuer which may hinder the start of compressions.

• Noises from compressions may lead the rescuer to believe they are hurting the patient.
Dispatcher-Assisted Cardiopulmonary Resuscitation
Risks for Patients Not in Cardiac Arrest

Lindsay White, MPH; Joseph Rogers, MS; Megan Bloomingdale; Carol Fahrenbruch, MSPH; Linda Culley, BA; Cleo Subido, RPL; Mickey Eisenberg, MD, PhD; Thomas Rea, MD, MPH

Background—Dispatcher-assisted cardiopulmonary resuscitation (CPR) instructions can increase bystander CPR and thereby increase the rate of survival from cardiac arrest. The risk of bystander CPR for patients not in arrest is uncertain and has implications for how assertive dispatch is in instructing CPR. We determined the frequency of dispatcher-assisted CPR for patients not in arrest and the frequency and severity of injury related to chest compressions.

Methods and Results—The investigation was a prospective cohort study of adult patients not in cardiac arrest for whom dispatchers provided CPR instructions in King County, Washington, between June 1, 2004, and January 31, 2007. The study focused on those who received chest compressions. Information was collected through review of the audio and written dispatch report, written emergency medical services report, hospital record, and telephone survey. Of the 1700 patients for whom dispatcher CPR instructions were initiated, 55% (938 of 1700) were in arrest, 45% (762 of 1700) were not in arrest, and 18% (313 of 1700) were not in arrest and received bystander chest compressions. Of the 247 not in arrest who received chest compressions and had complete outcome ascertainment, 12% (29 of 247) experienced discomfort, and 2% (6 of 247) sustained injuries likely or possibly caused by bystander CPR. Only 2% (5 of 247) suffered a fracture, and no patients suffered visceral organ injury.

Circulation January 5/12, 2010
American Heart Association
Focus: Creating & Maintaining CPR Quality

“Continuous Coaching”


- If caller is tired, ask if they are keeping their arms straight. If necessary, suggest a short rest but tell them to resume compressions as soon as possible.

- If the caller reports vomiting, tell him/her to turn the patient’s head to one side and sweep out the contents of patient’s mouth with fingers and resume compressions.
Continuous Coaching: Tactics & Tips

• Count out rate at 100 beats/minute
  • The beat to the disco classic “Stayin’ Alive”

• Let caller take over counting
  • Allows you to monitor and speed rate if needed

• Remind rescuer to press “hard and fast”

• Shhhhh! Don’t talk too much!
  • Let rescuers focus on what they’re doing!

• Tell them to switch if tired & multiple rescuers
  • Research at Laerdal suggests elderly rescuers can perform quality compressions for up to 10 minutes

• Stay with caller until EMS takes over
CPR Quality Matters!

**Conclusion.**—The association between bystander CPR and survival in out-of-hospital cardiac arrest appears to be confounded by CPR quality. Effective CPR is independently associated with a quantitatively and statistically significant improvement in survival.

*(JAMA. 1995;274:1922-1925)*

The quality of bystander CPR affected the hospital discharge rate after prehospital cardiac arrest. Good bystander CPR was associated with a higher proportion of patients who left the hospital alive than no good bystander CPR or no bystander CPR at all.

*Resuscitation 28 (1994) 195-203*
ADHS recommendation on AEDs

- Ask if an AED is available only if the event is in a public place with more than one rescuer present. If using an AED, instruct the rescuers to bare the patient’s chest.
Regional Variation in Survival
Nichol JAMA 2008