Cardiac Arrest
Maximize Survival in Maryland

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Maryland Institute for EMS Systems
Outline

- Define the challenge
- Where we are currently
- What we need from your partnership
Cardiac Arrest is a leading cause of death in the United States.
More deaths result from SCD than AIDS, breast cancer and lung cancer combined.

SCD compared to other diseases:

- AIDS: 16,000
- Breast Cancer: 40,000
- Lung Cancer: 157,400
- Total AIDS, Breast & Lung Cancer: *
- SCD: 300,000
Demographics of Out-of-Hospital SCAs in Maryland

Total Arrests: N = 10096
Rate: 61.7 per 100,000 population per year

Witnessed Arrests with Medical Cardiac Nature: N = 3514
Rate: 21.5 per 100,000 population per year
OOH EMS SCA Transports

EMS Out-of-Hospital Sudden Cardiac Arrest Transports
May, 1, 2015 to August 31, 2015
Source: eMEDS®, All Cardiac Arrest Etiologies

REGION 3A

Number of Transports
Monthly Average
EMS Out-of-Hospital Sudden Cardiac Arrest Transports
May 1, 2015 to August 31, 2015
Source: eMeds®, All Cardiac Arrest Etiologies

REGION 3B

Number of Transports
Monthly Average
OOH EMS SCA Transports

EMS Out-of-Hospital Sudden Cardiac Arrest Transports
May, 1, 2015 to August 31, 2015
Source: eMeds®, All Cardiac Arrest Etiologies
EMS Out-of-Hospital Sudden Cardiac Arrest Transports
May, 1, 2015 to August 31, 2015
Source: eMEDS®, All Cardiac Arrest Etiologies

REGIONS 1 & 2

REGION 4

Number of Transports
Monthly Average
The disparity
Regional Variation in Out-of-Hospital Cardiac Arrest Incidence and Outcome

In this 2006 JAMA study, 10 ROC regional outcomes from a v-fib arrest ranged from 7.7% to 39.9%

2/3 did not get bystander CPR
First Reported Out of Hospital Save
January 6, 1960 - Baltimore, Maryland

Dr. C. Park and Dr. Peter Safar, Dept. of Anesthesia,
Baltimore City Hospital and Capt. Martin McMahon,
Chief, Baltimore Fire Department Ambulance Service
Outline

• Definition of the problem
• Where we are currently
• What we need from your partnership
CARDIAC ARREST SURVIVAL:  
A TIME TO ACT

It is our national responsibility to improve the likelihood of survival without disability after **cardiac arrest**.

Read the new report from the Institute of Medicine

www.iom.edu/cardiacarrest
THE CARDIAC ARREST CHAIN OF SURVIVAL

Resuscitation Academy, 2014
IMMEDIATE PROVISION OF CARE IN COMMUNITY SETTINGS

• Time to first compressions and defibrillation are crucial and the best way to improve outcomes
• Any CPR or defibrillation delivered by the public is better than no care
• Bystanders and family members are needed to activate emergency medical services and provide care.
• EMS systems can facilitate bystander response through dispatcher-assisted CPR (aka telecommunicator CPR).
WHAT CAN MARYLAND DO?

- EDUCATE THE PUBLIC
- PARTNER WITH THE PUBLIC
WHAT CAN MARYLAND DO?

- CARES REGISTRY
- MULTIDISCIPLINARY GROUP
  - TO CHAMPION
  - PROVIDE ACCOUNTABILITY
- LINK TO EXCELLENCE
HIGH QUALITY CARE FROM EMERGENCY AND HOSPITAL PROFESSIONALS CAN SAVE LIVES

• High-performing communities provide examples of how functional public health infrastructures and well-organized health system responses can facilitate timely and effective treatment.

• Continuous quality improvement programs can encourage data collection across all sites of care, enable comparisons within and between EMS and health care systems, and lead to new treatments and best practices that improve population health and patient outcomes.
RECOMMENDATION 3.
ENHANCE THE CAPABILITIES AND PERFORMANCE OF EMS SYSTEMS

As the informal agency for EMS, NHTSA should coordinate with other federal agencies and representatives from private industry, states, professional organizations, first responders, EMS systems, and non-profit organizations

- to develop standardized dispatcher-assisted CPR protocols and national educational standards for use by all public safety answering points.

- to establish a standardized definition and training curriculum for high-performance CPR to be used in basic emergency medical technician training and certification.
WHAT CAN MARYLAND DO?

- EMS EXCELLENCE, UNIFORMLY SO
- STANDARDIZED PROTOCOLS
RECOMMENDATION 4.
SET NATIONAL ACCREDITATION STANDARDS RELATED TO CARDIAC ARREST FOR HOSPITALS AND HEALTH CARE SYSTEMS

The Joint Commission—in collaboration with the American Red Cross, the American Heart Association, hospital systems, hospitals, professional organizations, and patient advocacy groups—should develop and implement an accreditation standard for health care facilities specific to cardiac arrest care for adult and pediatric populations.
RECOMMENDATION 5.
ADOPT CONTINUOUS QUALITY IMPROVEMENT PROGRAMS

EMS systems, health care systems, and hospitals should adopt formal, continuous quality improvement programs for cardiac arrest response that

- Assign responsibility, authority, and accountability within each organization or agency for specific cardiac arrest measures;
- Implement core technical and non-technical training, simulation, and debriefing protocols to ensure that EMS and hospital personnel can respond competently to both adult and pediatric cardiac arrests; and
- Actively collaborate and share data to facilitate national, state, and local benchmarking for quality improvement.

INSTITUTE OF MEDICINE
OF THE NATIONAL ACADEMIES
Advising the nation • Improving health
THE NEED FOR RENEWED LEADERSHIP, ACCOUNTABILITY, AND STAKEHOLDER ADVOCACY

• Sustained federal, state, and local leadership are necessary to improve outcomes from cardiac arrest across the United States.

• The public should expect accountability from their leaders through public reporting of data related to cardiac arrest in their communities.

• To generate appropriate leadership and multiple levels of accountability, the resuscitation field needs to coordinate its advocacy efforts and establish unified goals.
WHAT WILL MARYLAND DO?

- Time to ACT is now
- Accountability
- Partnerships
MEASURE

IMPROVE
“Most cities don’t measure their performance effectively, if at all. They don’t know how many lives they are losing, so they can’t determine ways to increase survival rates.”

- Bob Davis, “Six Minutes to Live” USA Today, 2003
All Jurisdictions in MD
Use eMEDS

Operational Programs
(not exhaustive):

• Annapolis City
• Ocean City
• BWI Airport
• Ft. George Meade
• Aberdeen Proving Ground
• MSP Aviation Command
• NSA Bethesda
• US Naval Academy EMS
• 25+ Commercial Services
### CARES Hospital Fields

#### Part E: Hospital Section - Please complete the following questions

<table>
<thead>
<tr>
<th>Question</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>46 - ER Outcome</td>
<td>- Resuscitation terminated in ED</td>
</tr>
<tr>
<td></td>
<td>- Admitted to hospital</td>
</tr>
<tr>
<td></td>
<td>- Transferred to another acute care facility from the ED</td>
</tr>
<tr>
<td>47 - Was hypothermia care initiated or continued in the hospital</td>
<td>- Yes</td>
</tr>
<tr>
<td></td>
<td>- No</td>
</tr>
<tr>
<td>48 - Hospital Outcome</td>
<td>- Died in the hospital</td>
</tr>
<tr>
<td></td>
<td>- Discharged alive</td>
</tr>
<tr>
<td></td>
<td>- Patient made DNR</td>
</tr>
<tr>
<td>If yes, choose one of the following:</td>
<td>- Transferred to another acute care hospital</td>
</tr>
<tr>
<td></td>
<td>- Not yet determined</td>
</tr>
<tr>
<td>49 - Discharge From The Hospital</td>
<td>- Home/Residence</td>
</tr>
<tr>
<td></td>
<td>- Rehabilitation facility</td>
</tr>
<tr>
<td></td>
<td>- Skilled Nursing Facility/Hospice</td>
</tr>
<tr>
<td>50 - Neurological Outcome At Discharge From Hospital</td>
<td>- Good Cerebral Performance (CPC 1)</td>
</tr>
<tr>
<td></td>
<td>- Moderate Cerebral Disability (CPC 2)</td>
</tr>
<tr>
<td></td>
<td>- Severe Cerebral Disability (CPC 3)</td>
</tr>
<tr>
<td></td>
<td>- Coma, Vegetative State (CPC 4)</td>
</tr>
</tbody>
</table>

#### Hospital procedures

<table>
<thead>
<tr>
<th>Question</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>51 - Was the final diagnosis acute myocardial infarction:</td>
<td>- Yes</td>
</tr>
<tr>
<td></td>
<td>- No</td>
</tr>
<tr>
<td>52 - Coronary Angiography Performed:</td>
<td>- Yes</td>
</tr>
<tr>
<td></td>
<td>- No</td>
</tr>
<tr>
<td></td>
<td>- Unknown</td>
</tr>
<tr>
<td>If yes, provide date and time:</td>
<td>- hh:mm</td>
</tr>
<tr>
<td>53 - Was a cardiac stent placed:</td>
<td>- Yes</td>
</tr>
<tr>
<td></td>
<td>- No</td>
</tr>
<tr>
<td></td>
<td>- Unknown</td>
</tr>
<tr>
<td>54 - CABG performed:</td>
<td>- Yes</td>
</tr>
<tr>
<td></td>
<td>- No</td>
</tr>
<tr>
<td></td>
<td>- Unknown</td>
</tr>
<tr>
<td>55 - Was an ICD placed and/or scheduled:</td>
<td>- Yes</td>
</tr>
<tr>
<td></td>
<td>- No</td>
</tr>
<tr>
<td></td>
<td>- Unknown</td>
</tr>
</tbody>
</table>
How Many Patients?

• How many patients need outcome follow-up?
  – CARES Data from Pilot
    • Period 21 weeks (2/9/15 – 6/30/15)
      – Total CARES calls: 64
      – Ongoing ED Care: 25 (~ 1 case/week)
      – Admitted: 19
      – Discharged Alive: 6
  
• Projection for 1 year:
  – 47 Admitted
  – 15 Discharged Alive
How Many Fields?

- CARES Hospital Contact have to fill out?
- 1 – 10 fields; Depending on patient outcome and the level of care provided
  - Example: Patient with ROSC in field, died in ED
    - Hospital rep would fill out one field
  - Example: Patient with field ROSC, admitted to ED, PCI in cath lab, admitted to hospital
    - Hospital rep would fill out 10 fields
  - Example: Patient with field ROSC, admitted to ED, transferred to CIC Hospital
    - Hospital rep would fill out ~ 3 fields; CIC 7 fields
CARES Utstein Survival Report

Utstein Survival Report
All Agencies/National Data
Survival Data: From 1/1/12 Through 12/31/12

Cardiac Etiology Survival Rates
Overall: 10.0% (2511/25116)
Bystander Wt’d: 15.3% (5653/36924)
Unwitnessed: 4.1% (12824)
Utstein: 7.7% (3434)
Utstein Bystander: 37.3% (1922)

Resuscitations Attempted 28404

Non-Cardiac Etiology 3288

Cardiac Etiology 25316

Unwitnessed Arrest 12824
*see page 2

Witnessed Arrest (Bystanders) 9653

Initial Rhythm Asystole 2923
Sustained ROSC in field = 929

Expired in Field 1798 (62 incomplete)
Expired in ED 1397
Admitted to Hospital 735 (16 incomplete)

Admitted to Hospital 625
Discharged Alive 64
Neurological Status CPC 1 or 2 47
CPC 3 or 4 74
Unknown = 10

Initial Rhythm VF/VT 3434
Sustained ROSC in field = 1817

Expired in Field 1494
Expired in ED 1494
Admitted to Hospital 962 (25 incomplete)

Other Initial Rhythm 1296
Sustained ROSC in field = 1172

Expired in Field 1802
Expired in ED 1802
Admitted to Hospital 642
Discharged Alive 293
Neurological Status CPC 1 or 2 203
CPC 3 or 4 74
Unknown = 18
CARES

- Allows communities to determine OHCA outcomes & identify high risk groups and neighborhoods
- Enables clinical benchmarking to identify opportunities for improvement and track the diffusion of new therapies
- Promotes accountability to improve the quality and impact of prehospital care
- Observational data for effectiveness research
Where we want to be

- **eMEDS**
  - All jurisdictions submitting data through eMEDS

- **CARES**
  - Successful pilot
  - All jurisdictions participating
  - Mandatory cardiac arrest data fields
Welcome to Maryland Resuscitation Academy. Improving survival from cardiac arrest. We help EMS supervisors, dispatchers, and EMS field personnel improve cardiac arrest survival in the communities they serve. Join the leaders of Maryland’s EMS community for a course that will transform the way your EMS system manages cardiac arrests.
Goals

• Improve cardiac arrest survival rate in your community

• Establish and/or enhance cardiac arrest QI in your community

• Measure: Participate in a cardiac arrest registry

• Improve: Make programmatic changes
Maryland Resuscitation Academy

- Resuscitation Academy

- Number of personnel/first responders trained through the Maryland Resuscitation Academy:
  - 2012  65
  - 2013  140
  - 2014  350
Factors Which Determine Survival
Following Cardiac Arrest

Patient

Event

System
Determinants of a successful resuscitation

• Patient and event factors are important but cannot be changed by the EMS system

• System factors can be changed - most are time related
### Maryland Data

**Howard County**

<table>
<thead>
<tr>
<th>Year</th>
<th>Survival</th>
</tr>
</thead>
<tbody>
<tr>
<td>2013</td>
<td>50%</td>
</tr>
<tr>
<td>2012</td>
<td>44%</td>
</tr>
<tr>
<td>2011</td>
<td>42%</td>
</tr>
</tbody>
</table>

Baseline 2002-3 Data 19%ROSC to ED Arrival
Outline

- Definition of the problem
- Where we are currently
- What we need from your partnership
Your Partnership

• Support

• CASC Key Goal: To enhance the response to and care of patients with sudden out of hospital cardiac arrest in a way that will improve outcomes from sudden out-of-hospital cardiac arrest in all communities and populations in Maryland.

  – Mission of the Maryland Resuscitation Academy: Improve survival from sudden cardiac arrest throughout the State of Maryland.
CARES Roll Out

• EMS Jurisdictions
• Hospitals serving the jurisdiction
  – Easy if one hospital in the jurisdiction
• For Metro areas
  – EMS first
  – Add hospitals and healthcare systems
MIEMSS - Principal Roles

Regional Programs

- MIEMSS supports 5 regional EMS councils
- Addresses inter-jurisdictional and regional issues of importance
- Includes EMS providers, hospitals, 9-1-1 centers and public health agencies
Everybody in VF survives
It takes a **SYSTEM** to save a victim
Low Hanging Fruit

Dispatcher-assisted CPR*
High-performance CPR*
Rapid dispatch
A vision of the future

75% bystander CPR

AED applied < 4 min. 50% of the time

60% survival from VF for all communities