NEMSIS is my Nemesis: Prehospital Health Data

Robert B Dunne MD, FACEP, FAEMS
Associate Professor
Director, Division of Prehospital Care
Wayne State University
Medical Director, Detroit Fire Department
What is Prehospital Health Data

- Generally everything that is collected in the care of a patient out of the hospital.
  - Ambulance transport
  - Non Transport
  - Included Demographics
  - Response data
    - Location
    - Dispatch
    - 911 Call taking

- Sources
  - National EMS Information System
    - State and Local IS
  - Registries
    - Disease Specific
    - Geographic Specific
System Components

911

Dispatch

SPECIALTY CARE

AMBULANCE

EMERGENCY
Why do you want to know this

- Patient Outcomes
- Surveillance
  - Disease specific
  - Injury Patterns
  - Prevalence
  - Community health
- Utilization
- Prediction of Needs
- Federal Mandates
Using The Data: Acute MI (Heart Attacks)

D2B and Mortality

N= 43,801 NCDR STEMI Patients
2005-2006

In hosp Mort Adjusted for Clinical + Procedural Features

P <0.001 for trend

Rathore BMJ 338: b 1807, 2009
Mapping: What Can Be Done with the Data

Census Tract Risk in Detroit, MI

- Low Risk (n=111)
- Intermediate Risk (n=14)
- High Risk (n=52)
- Hamtramck-No Detroit EMS Data
- Highland Park-No Detroit EMS Data
- No Cardiac Arrest Events

Detroit, MI Mean Incidence of Cardiac Arrest = 5.15 per 10,000 people
Detroit, MI Mean Bystander CPR Rate = 16.4%
U.S. Mean Bystander CPR Rate = 40.8%

Intermediate Risk: Incidence of Cardiac Arrest > 5.15 per 10,000 people, Bystander CPR Rates > 16.4% but < 40.8%

High Risk: Incidence of Cardiac Arrest > 5.15 per 10,000 people, Bystander CPR Rates > 16.4%
### Resuscitations Attempted

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
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<tbody>
<tr>
<td></td>
<td>270</td>
</tr>
</tbody>
</table>

### Non-Traumatic Etiology Survival Rates

<table>
<thead>
<tr>
<th>Type</th>
<th>Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall</td>
<td>8.2%</td>
</tr>
<tr>
<td>Bystander Wit'd.</td>
<td>6.3%</td>
</tr>
<tr>
<td>Unwitnessed</td>
<td>7.3%</td>
</tr>
<tr>
<td>Utstein¹</td>
<td>13.6%</td>
</tr>
<tr>
<td>Utstein Bystander²</td>
<td>25.0%</td>
</tr>
</tbody>
</table>

### Bystander Intervention Rates

<table>
<thead>
<tr>
<th>Type</th>
<th>Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPR</td>
<td>28.2%</td>
</tr>
<tr>
<td>AED Use</td>
<td>0.6%</td>
</tr>
</tbody>
</table>

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¹ The Utstein definition is used for cardiac arrest that is witnessed and the victim is resuscitated at a hospital or in the hospital setting.

² Utstein Bystander is a resuscitation performed at a hospital or the hospital setting, and the arrest was witnessed or presumed witnessed.
History of EMS Data

- We can date it back to the “modern age of EMS”
  - 1966: Accidental Death and Disability

“A review of ambulance services in the United States indicates a paucity of information and a limited framework for the collection of data on and the evaluation of current ambulance services.” (Page 13)

- 1973 Public Law 93-154 defined 15 elements of EMS
  - 11. Standard patient record (run sheet)
    - Patient demographic data
    - Unit ID
    - Response and transport intervals
    - Incident location
So What Happened In Between?

- Largest event happened in 1992-1993
  - The NHTSA EMS Data Elements Version 1

- Great try, the spirit was there

- Too loose of a standard

- EMS relatively uneducated to the potential of computer technology
  - 2003: The EMS Outcomes Evaluation Project:
    
    “No local, state, or federal databases were suitable for use due to inconsistent data definitions, inconsistent data formatting, and variation in inclusion criteria.”  (Page 8)
Late 90’s, the National Association of State EMS Directors decided there was a **NEED** for uniform data collection

- Led to NEMSIS Standard
- Eventually tied to $$$ for Road Funding, Crash Data
Where We Need to Be

- EMS is one piece of a health care puzzle
The Data Sources
NEMSIS Overview

- Composed of two components:
  - **Demographic dataset:**
    - Standardized set of data fields that describe an EMS system
  - **EMS dataset:**
    - Standardized set of definitions describing an EMS event
  - Evolution to Prehospital Electronic Health Record
Number of fields to be collected:

States/Regions set the minimum number of fields

List in current dictionary

State List
**THE PORTABILITY OF DATA** - the **NEMSiS** STANDARD.

- **Patient Care Report Software**
  - **Agency A's Software**
    - Patient Care Report
  - **Agency B's Software**
    - Patient Care Report
  - **Agency C's Software**
    - Patient Care Report

- **Medical Device**
- **911 Center**
- **Trauma Registry**
  - XML Transfer - In Progress (near Future)
- **The State Database**
- **National Database**

**BIG DATA**
What the Public Cares About

Response Time
On-Scene Time
Transport Time
Restock Time

911 Answer Call Processing

Affects Response Times
Time Graphs

Response Time Percentile Graph

- Average
- 90% Mark

EMS Agency

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100% 110%
0 min 1 min 2 min 3 min 4 min 5 min 6 min 7 min 8 min 9 min 10 min 11 min 12 min 13 min 14 min 15 min 16 min 17 min 18 min 19 min >19 min

- 8.3%
- 20.9%
- 32.7%
- 55.9%
- 61.8%
- 81.1%
- 90%
- 95.7%
- 99.2%
- 100%
Unit Distribution -

Let the computer do the thinking

- Red dots are posting locations
- Polygons are response areas for each unit

Software: MARVLIS
National Trauma Registry

- Use by Verified Trauma Centers and Trauma SYSTEMS
- Evaluates trauma care scene to discharge
- About 40% of the TR dataset’s elements come from the NEMSI S dataset
  - Electronic highway (two-way) for data to be submitted to hospitals and back
- OTHER REGISTRIES
  - Being Developed
  - None as Mature as Trauma
  - Stroke. STEMI, Cardiac Arrest (CARES)
The manner in which data are missing from a sample of a population. These methods are very sensitive to assumptions made about the missingness mechanism or about the distributions of the variables with missing data.
ONGOING ISSUES

- LINKAGE
  - PROBABLISTIC
  - DETERMINISTIC

- WHERE DOES THIS OCCUR
  - Registries- often disease specific
  - State Data Systems

- Health System Data
  - Interfaces
  - HIE – Health Information Exchange
  - Beta at Best

- Data Quality
  - Convenience Sample at Best

- Getting to the Promise of Data
- Emergency Cardiac and Stroke System
  [http://www.doh.wa.gov/hsga/hdsp/default.htm](http://www.doh.wa.gov/hsga/hdsp/default.htm)
- Development of Systems of Care for STEMI Patients: The EMS and ED Perspective; [http://circ.ahajournals.org/cgi/reprint/116/2/e43](http://circ.ahajournals.org/cgi/reprint/116/2/e43)
- Implementation Strategies for EMS Within Stroke Systems of Care
- AHA E-learning: Learn Rapid STEMI ID, Prehospital Stroke
- Stroke Rapid Response™ Prehospital Education Training
- Washington Stroke Forum