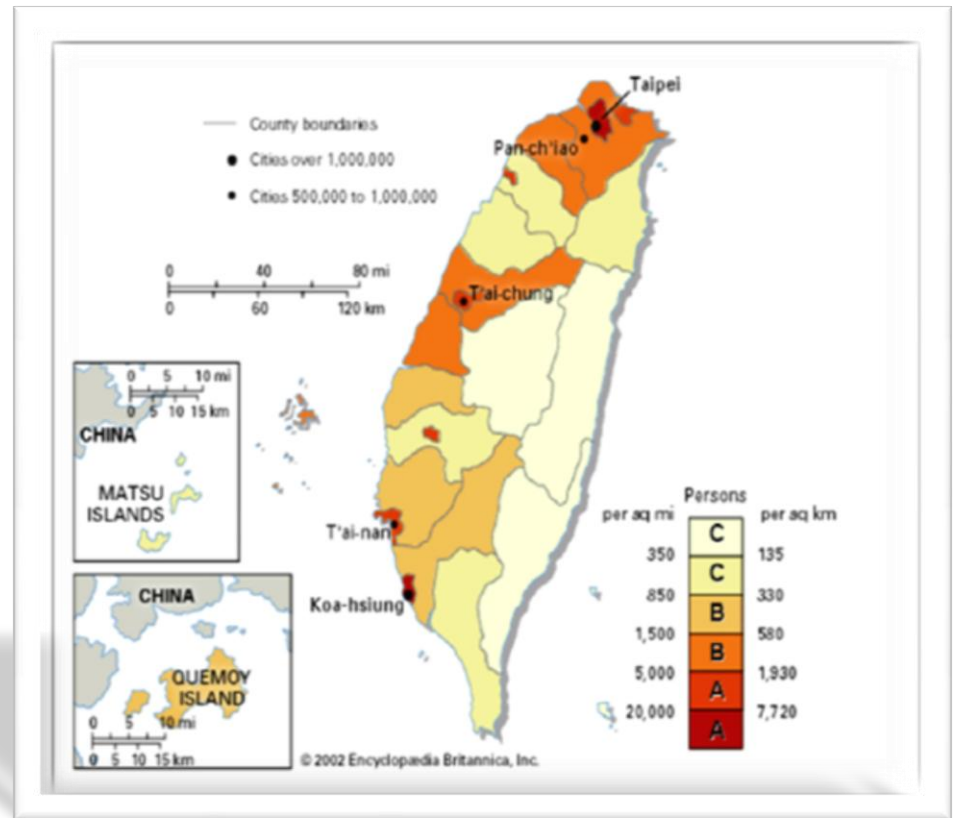


# EMS Research in Taiwan

**Chih-Hao Lin, M.D.**

# Taiwan

- Population:
  - Density: 23 million
  - OHCA VT/VF: 10 ~15% (Taipei data)
- EMS systems:
  - Fire-based
  - BLS vs. ALS
  - Medical oversight
  - Registration system
    - OHCA
    - Major trauma



# Taiwan EMS Research

## EMS Research Domains (by IOM 2006)

| Study Design      | Clinical | System | Education |
|-------------------|----------|--------|-----------|
| Epidemiology      | ★ ★ ★    | ★      |           |
| Simulation        |          | ★      | ★         |
| B-&-A trial       | ★        |        |           |
| Parallel trial    | ★        | ★      |           |
| RCT               | ★        |        |           |
| Registry Databank | ★        |        |           |
| Meta-analysis     |          |        |           |

# Epidemiology: Descriptive (1)

- **Utility of local EMS**

- Taipei (Hu SC et al, 1996)
- Keelung (Chen JC et al, 1996)
- I-Lan (Hu SC et al, 1997)
- Nan-Tou (Hwang YC et al, 2007)

*ALS need: 9~16 %*

- **Utility by specific groups**

- PED cases: low utility (Loin CY et al, 2007)
- Characters of frequent ED abusers (Chi CH et al, 2001)

# Epidemiology: Descriptive (2)

- **Disaster responses**
  - Air crash (Lee WH et al, 2002)
  - Chi-Chi Earthquake (Chen KT et al, 2003)
  - SARS (KO PCI et al, 2004)
- **Medical needs in mass activities** (Kao WF et al, 2001)
- **Review of Taiwan's experience and compared with U.S. approaches in managing surge needs.** (Shih FY, 2005)



# Epidemiology: Predictive

- Predictors of OHCA survival
  - Adult non-traumatic OHCA (KO PCI et al, 2004)
  - Pediatric non-traumatic OHCA (Li CJ et al, 2010)
  - Pediatric traumatic OHCA (Lin CY et al, 2007)

Shockable rhythm >> non-shockable in adult

Shockable rhythm = PEA >> non-shockable in Ped.

Shorter CPR (to achieve ROSC), better outcome.

# Clinical: Observation

- CPR Quality in EMS

- By AED records

- (Ko PCI et al, 2004)

- By video records

- (Wang HC et al, 2007)

Suboptimal !!

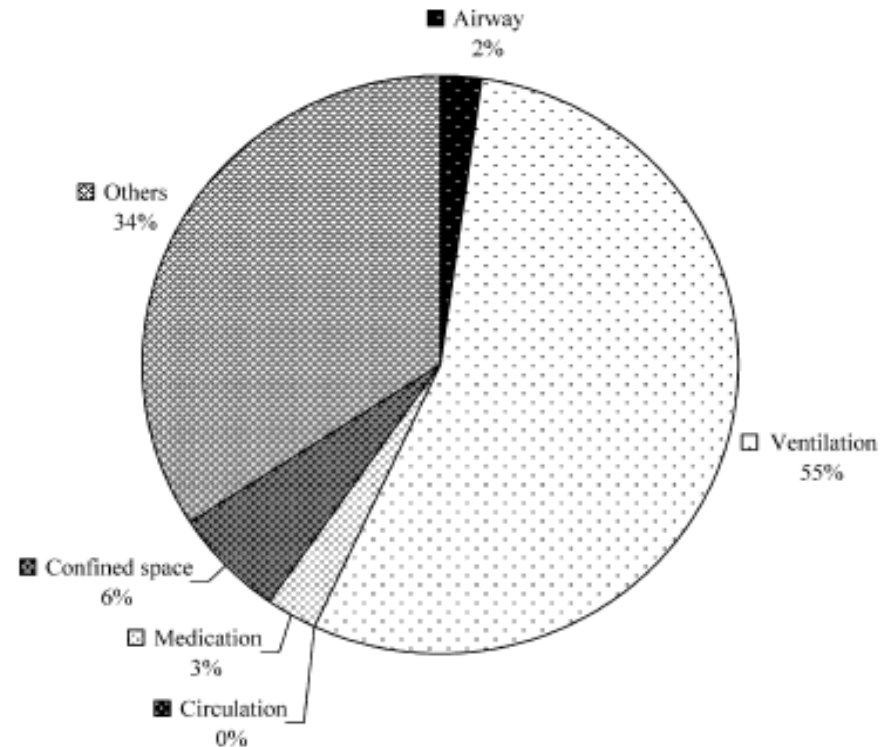


Figure 5 Causes of time lag from ambulance loading to first chest compression in the manual group.

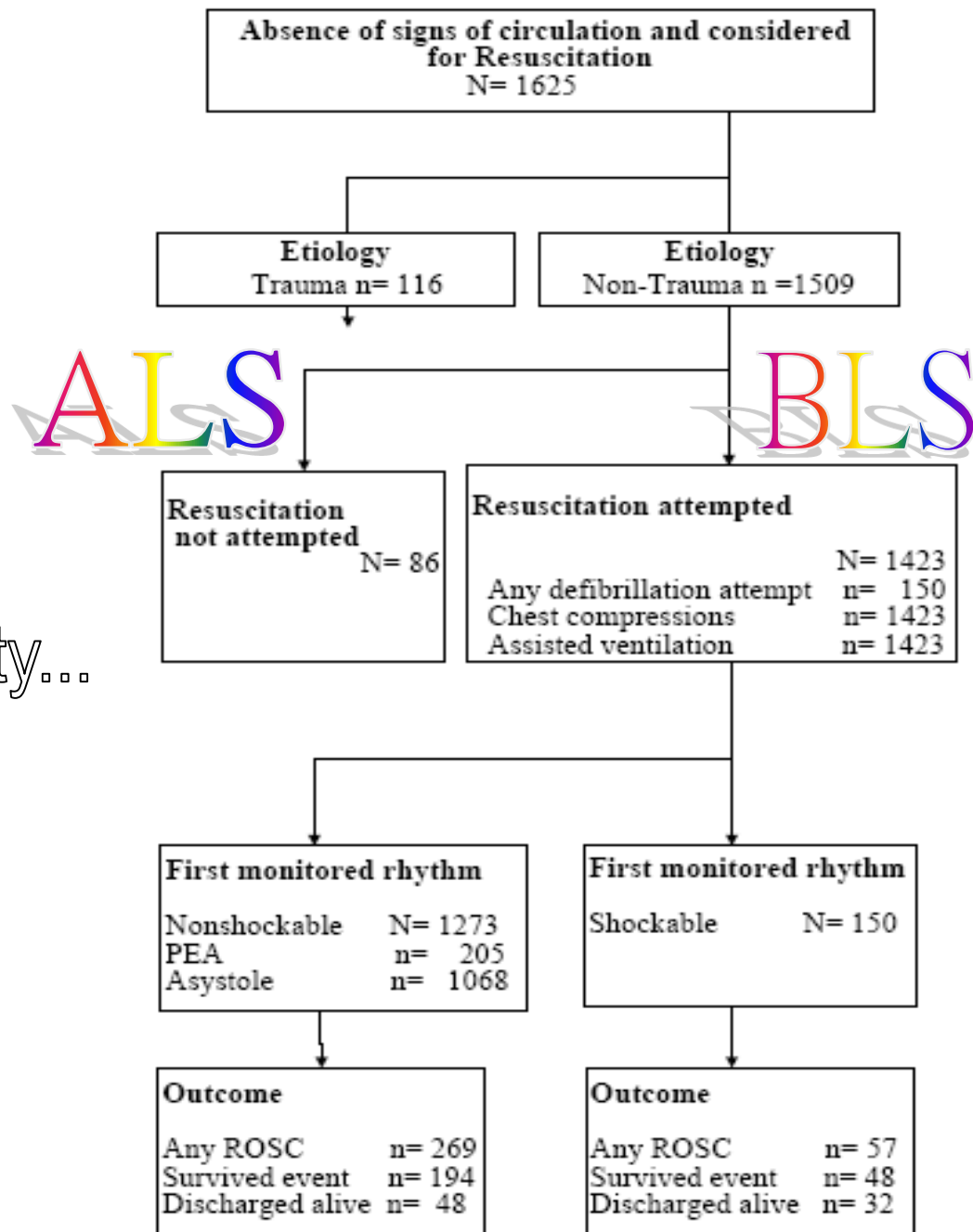
# Clinical: Intervention

- **AED impact** in Taipei OHCA outcome (Ko PCI et al, 2004)
- **Mechanical thumper** use in ambulance transport  
(Wang HC et al, 2007)
- **ALS: Cost-effectiveness analysis** by Taipei OHCA data (Yen RS et al, 2005)
- **ALS impact** in Taipei OHCA outcome (Ma et al, 2007)
- **Clinical trial:** Analyzing first vs. Compression first?  
(Ma et al, 2010)



# ALS impact in OHCA outcome in Taipei

During the process of phasing in ALS capability...



# Adjusted Odds Ratios for Outcomes

|   | ROSC(%) |           |          | Survival to ED/ICU Admission(%) |           |          | Survival to Hospital Discharge(%) |           |          |
|---|---------|-----------|----------|---------------------------------|-----------|----------|-----------------------------------|-----------|----------|
|   | OR      | 95%CI     | <i>p</i> | OR                              | 95%CI     | <i>p</i> | OR                                | 95%CI     | <i>p</i> |
| Type of services<br>(ALS vs. BLS-D)                             | 1.57    | 1.18-2.08 | 0.002    | 1.65                            | 1.21-2.25 | 0.002    | 1.41                              | 0.85-2.32 | 0.18     |
| Age group<br>(66+ vs. 0-65)                                     | 1.25    | 0.94-1.67 | 0.12     | 1.10                            | 0.80-1.51 | 0.57     | 1.32                              | 0.78-2.23 | 0.30     |
| Gender<br>(Male vs. Female)                                     | 0.93    | 0.71-1.23 | 0.63     | 1.01                            | 0.74-1.37 | 0.97     | 1.09                              | 0.66-1.79 | 0.74     |
| Witnessed by Bystander<br>(Yes vs. No)                          | 1.12    | 0.86-1.47 | 0.41     | 1.03                            | 0.75-1.39 | 0.87     | 1.42                              | 0.89-2.29 | 0.15     |
| Bystander CPR<br>(Yes vs. No)                                   | 1.72    |           |          |                                 |           |          |                                   |           |          |
| Initial Monitored<br>Rhythm<br>(Shockable vs.<br>Non-Shockable) | 2.17    |           |          |                                 |           |          |                                   |           |          |

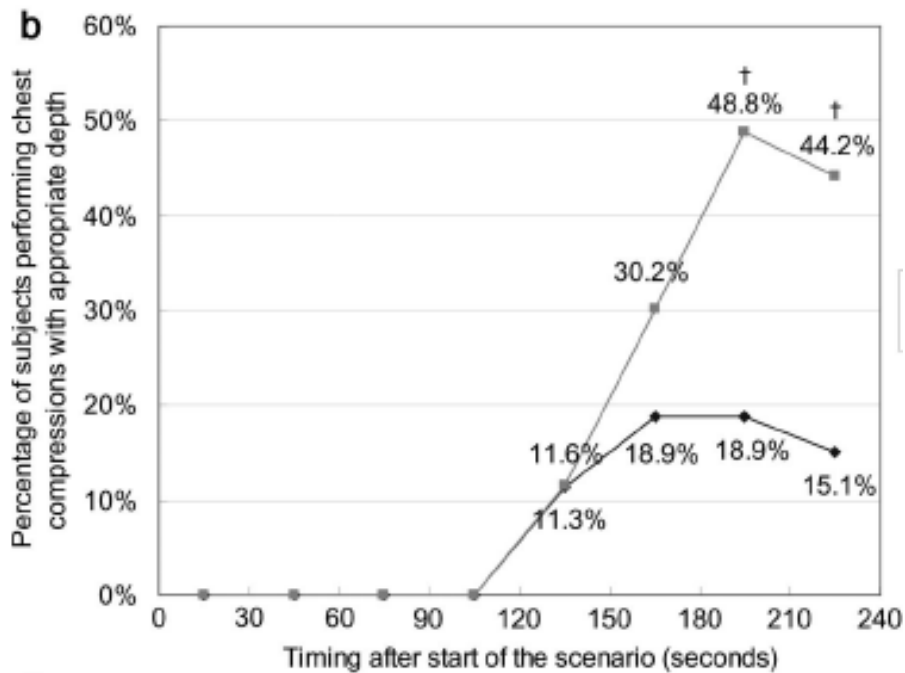
C/W OPALS REPORT...  
WHAT MAKES DIFFERENCE?

# System: Optimization

- EMS system evaluation
  - Performance (commutation and accuracy) of dispatcher center (Ma et al, 2007)
  - On-sense triage of traumatic patient by EMTs (Ma et al, 2004)
  - Video-assistant triage of aeromedical triage (Tsai CL et al, 2007)
  - Computer-simulated allocation of ambulances (Shih CL et al, 2001)

# Education

- 3G mobile phone in dispatcher-instructed CPRQ  
(Yang et al, 2009.)

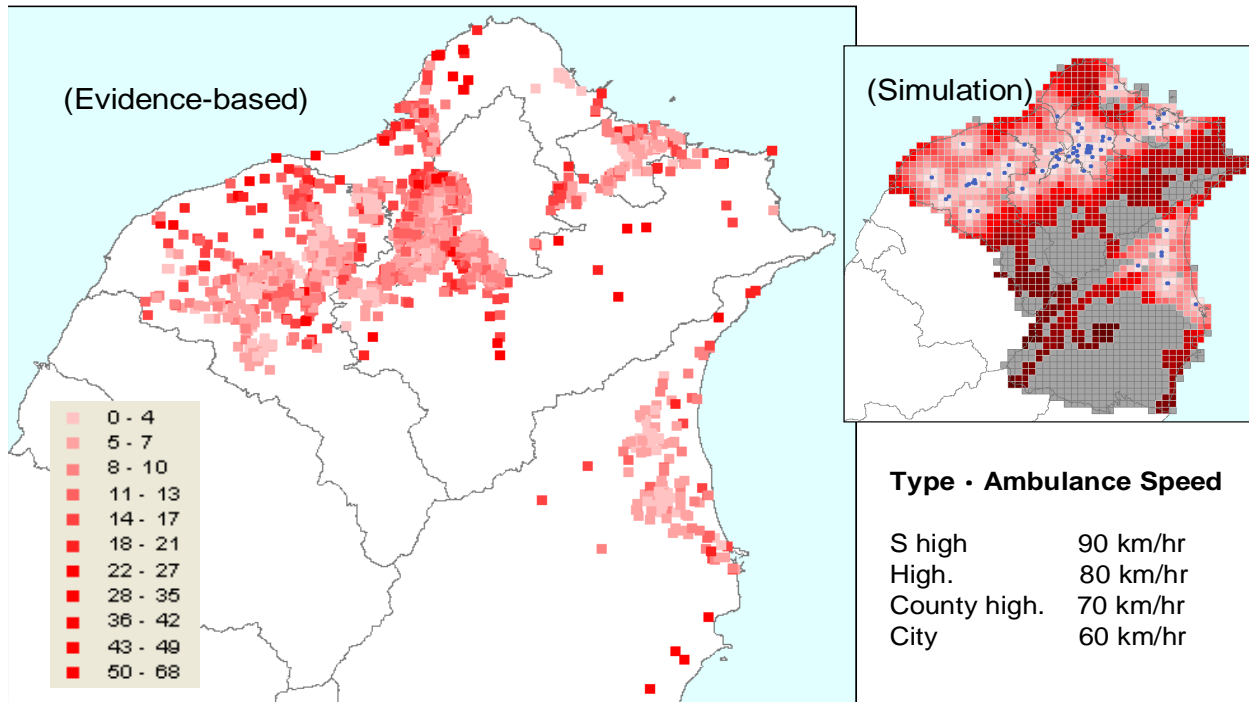


3G-phone assisted dispatch in online direction of CPR show potential in improving CPR quality.

# Application of New Technique (1)

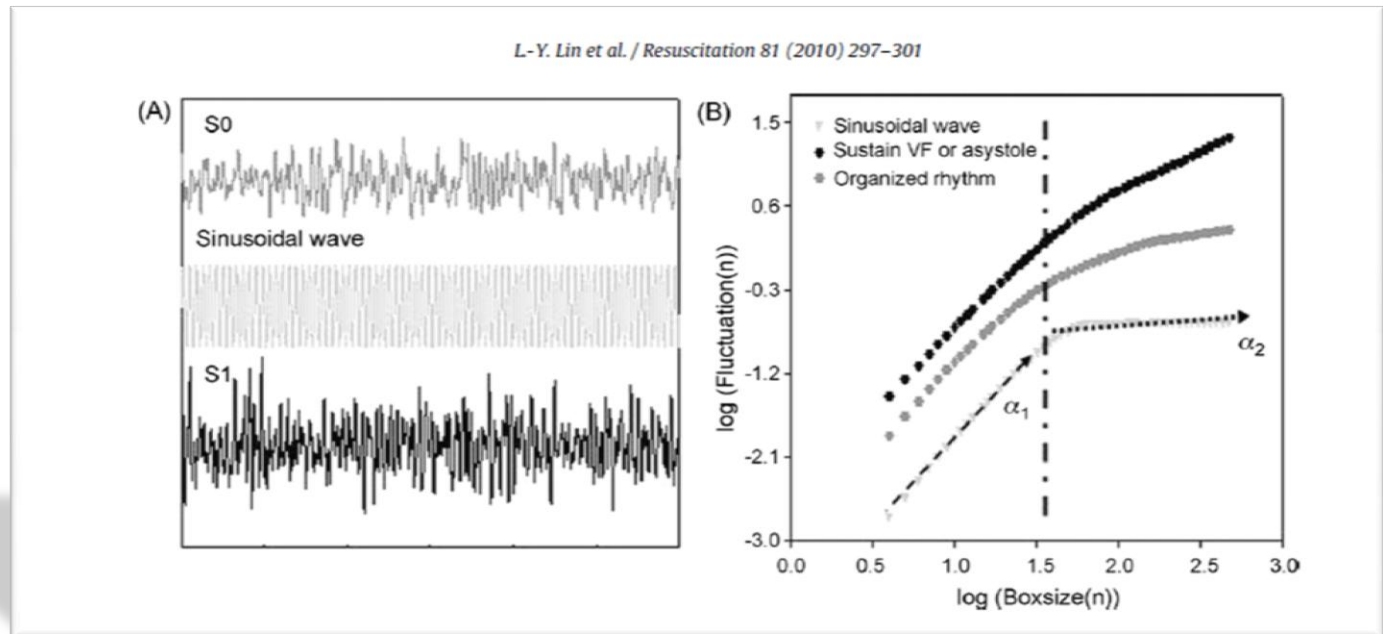
- GIS-assisted analysis of accurate EMS times.  
(Ko PCI et al, 2009)

Ambulance Transportation Time  
simulation vs reality



# Application of New Technique (2)

- Heart-rate variability (DFA, AMSA,... etc.)
  - Predict of short-term ROSC in OHCA ([Chen et al. 2009](#))
  - Predict of successful defibrillation in OHCA ([Lin LY & Ko PCI et al. 2010](#))



# Taiwan EMS Research: SWOT

- Windows of opportunity
- No need to reinvent the wheel

## Strength

- Data collection infrastructure
- Coordination: between fire and health
- Manpower

## Weakness

- Public demand increasing
- Frequent disasters and public health emergencies
- Application of new tech

## Opportunity

- Rapid progress in neighboring countries
- Stagnation: difficult to change in established systems

## Threats