



Development of a Database for Comparative Effectiveness Research (CER) on Prehospital and In-hospital Emergency Care

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Academy Health Annual Research Meeting
Baltimore, MD
June 23, 2013

Acknowledgement

This research was supported by the Agency for Healthcare Research & Quality (Grant no. R01-HS020097-01)



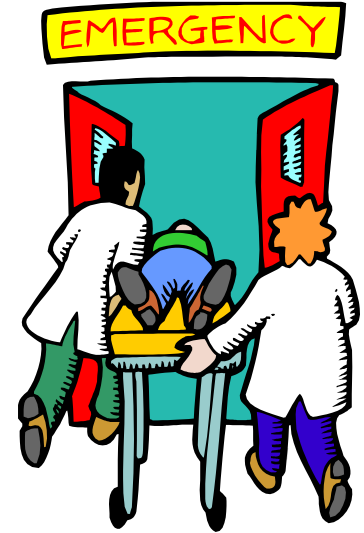
Project team

- Rutgers Center for State Health Policy (CSHP)
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- NJ Dept of Health & Senior Services (DHSS)
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- Henry Wang, MD (U of AL-Birmingham)
- Mark Merlin, DO (NJ EMS Task Force, Newark BI MC)
- Jared Kutzin, DNP, MPH, RN, EMT
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Project motivation

- Emergency medicine
 - Wide range of diagnoses & procedures
 - Time sensitive, ambiguous situations
 - Evidence base less developed than other specialties
- Prehospital emergency medical service (EMS)
 - Even less evidence-based
 - Historically separate from rest of health sector
 - Intensely local/under-resourced
- IOM reports (2006/2007) ==> priority area for research
- Barrier: *Lack of large-scale integrated databases across emergency care settings*



Specific Aims of Enhanced Data Grant

1. Build a sustainable database to support comparative effectiveness research (CER) on medical care provided across prehospital and hospital settings in NJ
2. Demonstrate the utility of the database by evaluating out-of-hospital cardiac arrest (OHCA) outcomes in therapeutic hypothermia (TH) centers versus other hospitals



Overview of component databases

1. NJ Discharge Data Collection System

- Hospital inpatient/ED billing records

2. EMS Data Warehouse

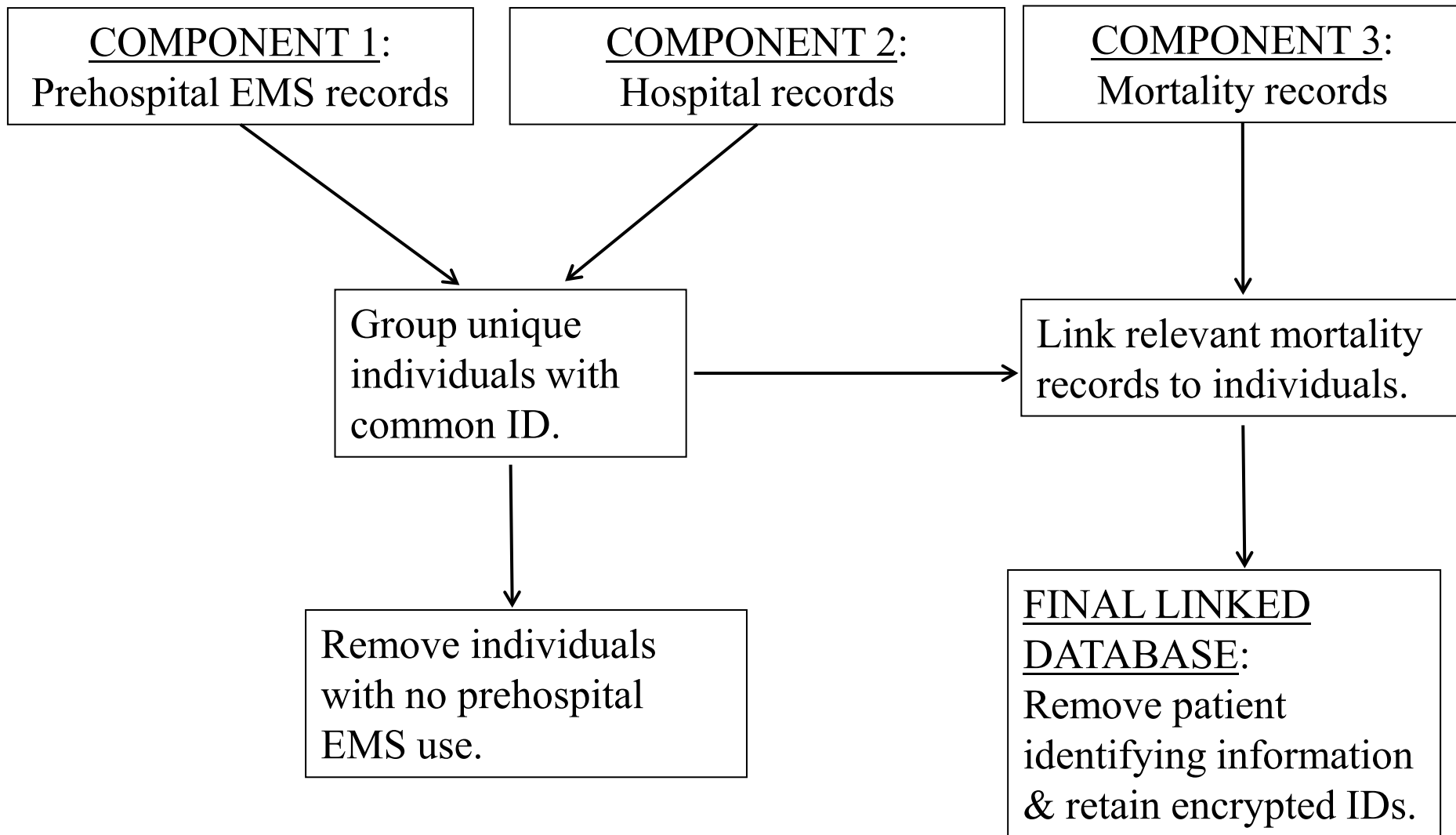
- EHRs maintained by ambulance companies
- Pilot data in 2006, Statewide in 2008
- Include response times, vital signs, prehospital procedures, etc.
- Universal participation among advanced life support (ALS) units
- \approx 50% participation among basic life support (BLS) units

3. Mortality data (State vital records system)

Data years: 2009-2010 linked. 2011 in process.

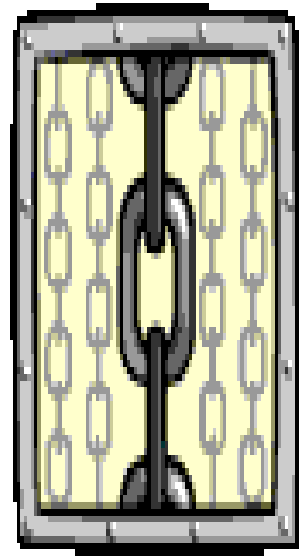
Supplemental data collection: Hospital TH survey

Overview of data linkage



Mechanics of data linkage

- Patient identifiers across components
 - Primary: Name, DOB, SSN
 - Secondary: Sex, race/ethnicity, residential zip code
- LinkKing software
 - Combination of deterministic & probabilistic linkage
- Must have at least one of the primary identifiers
 - No problem for hospital & mortality data
 - EMS records: Reduced from 1,253,208 to 899,314 (↓ 28.2%)
- Retain linked records w/highest probability of a valid match based on LinkKing “certainty levels”



Units of analysis, 2009-2010

Unit of Analysis	Number of Observations
Total EMS records	899,314
Records with EMS treatment and transport	706,584
Subset of above records linked to a hospital record	535,771*
Unique EMS incidents	780,297
Unique EMS incidents linked to a hospital record	490,068
Unique individuals	512,560
Unique individuals with linked mortality record	56,354

* 75.8% of treated & transported cases linked to a hospital record
(Linkage rate varies by condition treated)

Multiple unit EMS response

EMS units	Number of incidents	Percentage of incidents
1	664,657	85.2%
2	112,601	14.4%
3	2,731	0.35%
4 or more	308	0.04%

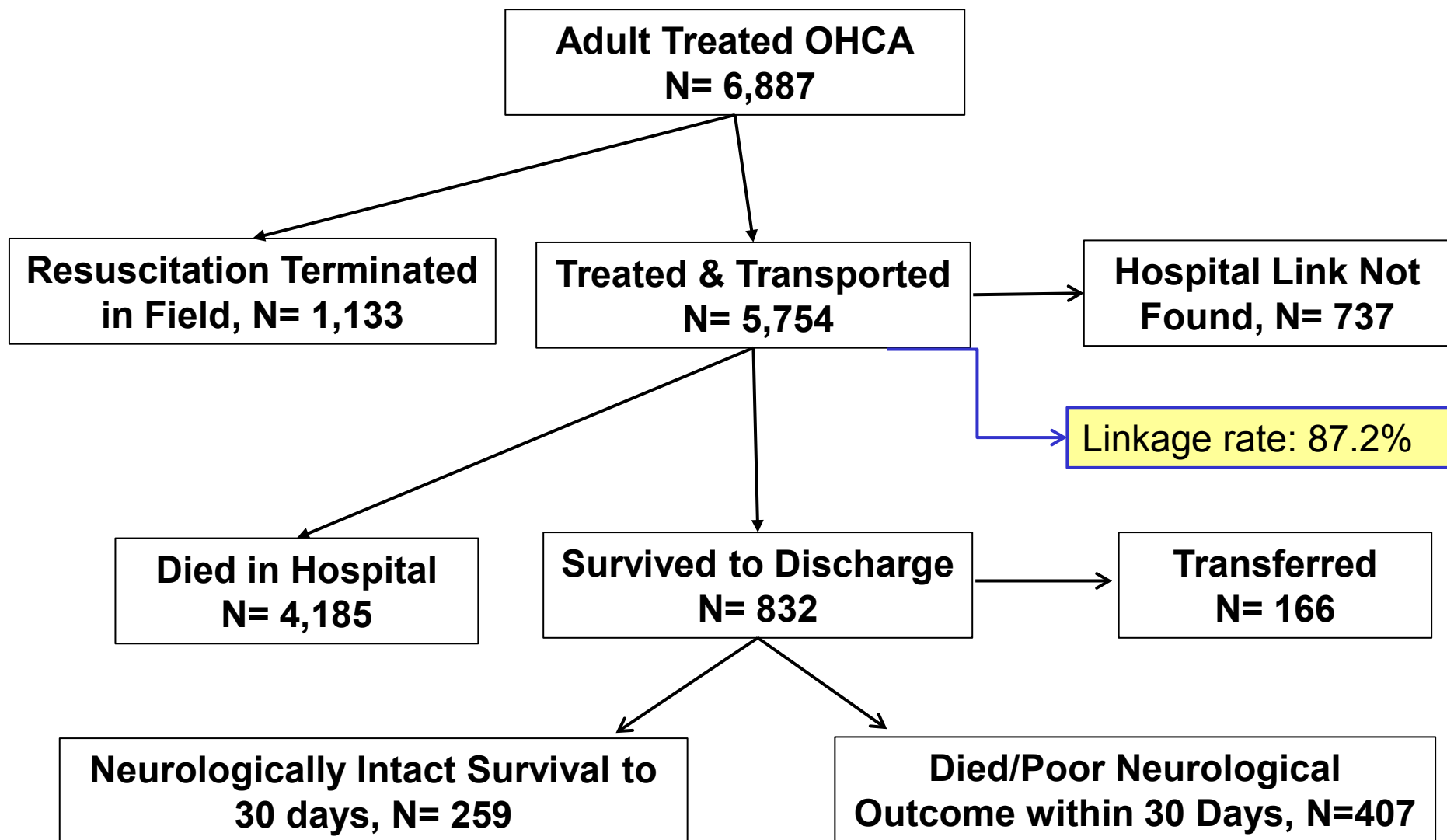
* Number of EMS units per incident varies by response type

Cardiac arrest analysis

- Population: Adults treated & transported by EMS for OHCA
- Comparison: Transport to TH centers vs other hospitals
- Outcomes: Neurologically intact survival ...
 - to discharge
 - at 30 days post-arrest



Exclusion/outcome analysis, 2009-2010



Descriptive analysis of patients at TH vs other hospitals

	TH centers (N = 2,363)	Other hospitals (N = 2,479)
Neuro intact survival		
To discharge*	11.9%	8.2%
At 30 days*	7.4%	3.4%
Selected covariates		
EMS response time*		
Less than 4 minutes	16.8%	14.4%
4-8 minutes	41.6%	36.0%
More than 8 minutes	41.6%	49.6%
Witnessed arrest*	60.0%	55.0%
Defibrillation by EMS*	52.3%	46.1%
Shockable rhythm	9.2%	8.7%
Number of hospital beds*		
Less than 200	19.6%	46.1%
200-399	49.8%	42.4%
400 and above	30.6%	11.5%
Teaching hospital*	14.8%	7.6%
Female sex	37.2%	36.4%

Final thoughts

- Successful linkage of EMS/hospital/mortality data for 2009-2010, 2011 underway
- Analysis of TH for OHCA patients currently under review
- Linked database available for future applications
 - CER on prehospital/hospital procedures
 - Public health surveillance/planning
 - Other applications

