Emergency Medical Services
San Mateo County Health System

Stroke Data Matching Project:
Following the Continuum of Care from Pre-Hospital to Hospital

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Overview of Presentation

- Background
- Matching Study Results
- Preliminary Look at Data
- Next Steps

Background

- There is a need for a better measure of ambulance contractor performance in pre-hospital stroke identification
  - Hospital outcome data needed for assessment
- Core questions were developed around collected data variables from both the pre-hospital and hospital side of stroke care

Initial Matching Attempt:

California Department of Public Health

- Initial Matching: de-identified ambulance contractor data* with de-identified California Stroke Registry (CSR) data.
- Base SAS coding used by CDPH.
  - Results: ~ 50% match rate based on matching the following four data variables: admission date, hospital destination, gender, and age

*(potential stroke patients chosen based on a primary impression of "neurological deficit/CVA/TIA")

Second Match Attempt: Dataflux

- DataFlux Matching: de-identified ambulance contractor data* with de-identified California Stroke Registry (CSR) data.
- Probabilistic Matching program developed by the SAS company.
  - Results: ~ 50% match rate based on matching the following four data variables: admission date, hospital destination, gender, and age

*(potential stroke patients chosen based on a primary impression of “neurological deficit/CVA/TIA”)

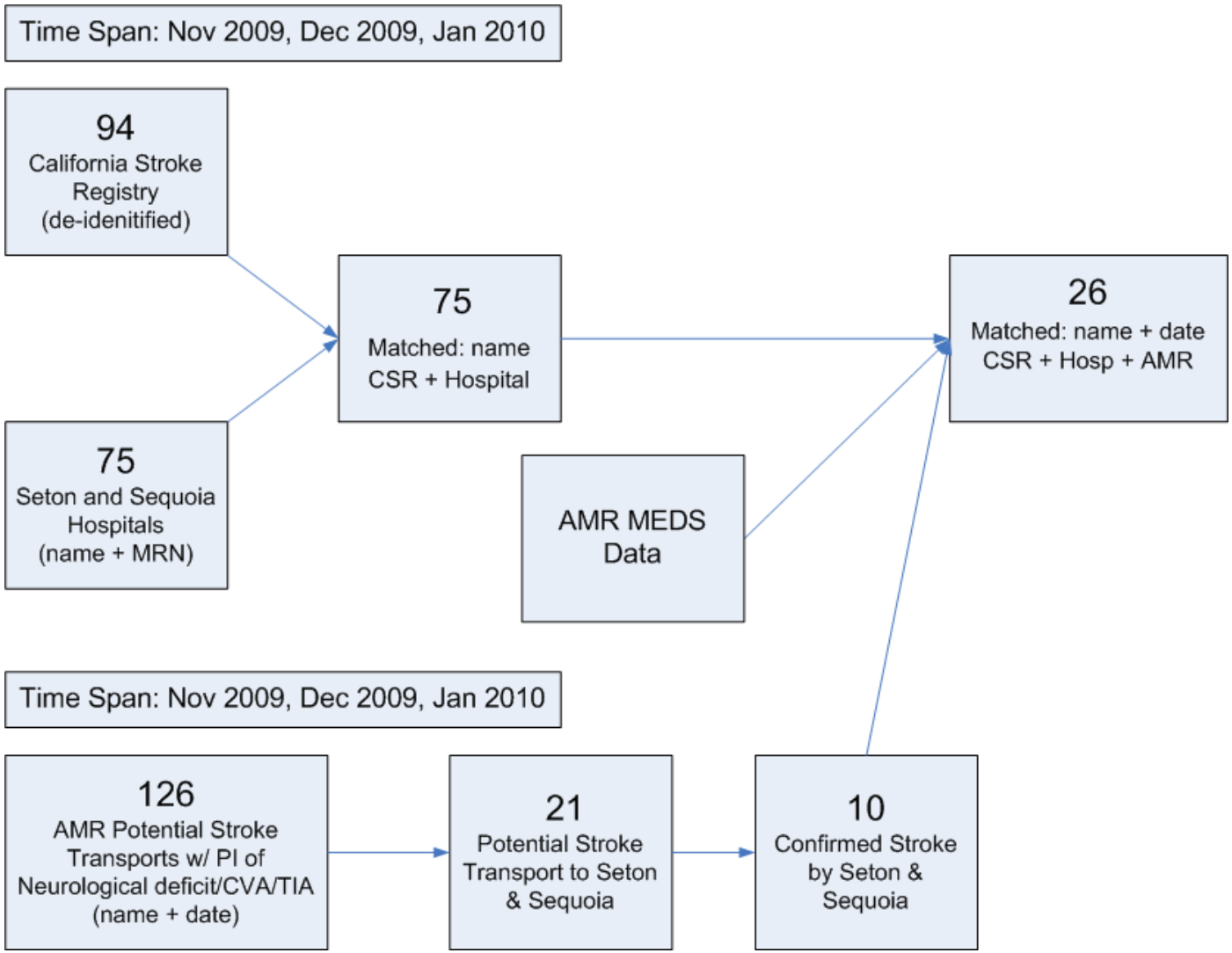
Second Matching Attempt: con't

- Feedback from DataFlux analysis: probabilistic matching (also known as 'fuzzy matching') relies on an complex algorithm which uses identifying information (name, age, gender, address) specific to a person to create a unique 'Match Code', a string of letters and numbers. A person's first and last name are the most unique identifiers that can be used, aside from something like address or SSN. Not using first and last name results in a weaker Match Code, which creates a lower probability that records being matched are describing the same individual.

Final Matching Study: By Name

- Matching by First and Last Name:
  - Study used data from Nov 2009 thru Jan 2010
  - Seton Hospital and Sequoia Hospital participated in this study by providing first/last name and Get-With-The-Guidelines record number. That record number was then matched to California Stroke Registry data.
  - The resulting patients were then matched by first/last name and admission date to patients in the AMR MEDS database.

Name Matching Study Results



Matching Study Discussion

- Matching by admission date, hospital destination, gender, and age :
  - While there was a match rate of 50% based on the above variables there was no confirmation that the patients on the pre-hospital side and the patients on the hospital side were the same individual. This is due to EMS not knowing whether or not the individuals who were identified by medics as potentially having a stroke, actually had a stroke. Due to the limitations of our pre-hospital stroke query, there is a high probability that non stroke patients are being matched to actual stroke patients.

Matching Study Discussion

- Matching by first/last name :
  - There was a 100% match rate between actual stroke patients on the hospital side, and potential/non-potential stroke patients on the pre-hospital side.

Why does a 100% match matter?

- Accurate detection of meaningful trends
- Accurate assessment of medic's stoke identification abilities
- Ability to determine the true effectiveness of stroke education delivered to the community
- Being able to more accurately tailor the stroke trainings delivered to the medics, based on any trends seen in the matched data.
- Ability to measure the impact of primary stroke centers with invasive capabilities

A Look at the Matched Data

Stroke Identification on Pre-Hospital Side:

Ambulance Primary Impression for the 26 matches between pre-hosp and CSR for patients with hospital documented stroke

Altered level of consciousness (unknown cause)	**10**
Neurological deficit/CVA/TIA	**10**
Weakness/dizzy/sick/nausea	**2**
Other	**2**
Headache	**1**
Syncope/near-syncope	**1**
Total	**26**

A Look at the Matched Data: #2

Stroke Identification on Hospital Side:

Hospital diagnosis for the 26 matches between pre-hosp and CSR, for patients with hospital documented stroke.

Hospital Diagnosed Stroke Type	
Ischemic Stroke	13
Transient ischemic attack (<24 hours)	3
No stroke related diagnosis	2
Hemorrhagic	8
Total	26

A Look at the Matched Data: #3

Stroke Identification on the Pre-Hospital Side:

Of the 21 suspected stroke patients identified by paramedics, 48% (n=10) were confirmed as having a stroke by the hospitals.

Receiving Facility	Data Source	Nov	Dec	Jan	Total
Sequoia	AMR	1	4	2	7
	CSR (confirmed stroke)	1	1	0	2
Seton	AMR	3	6	5	14
	CSR (confirmed stroke)	3	4	1	8

A Look at the Matched Data: #4

Time Last Seen Normal

Of the patients transported to the hospital who had a actual stroke (identified in CSR), 18 of 26 patients had "Time last seen normal" recorded.

Documented Glucose

Of the patients transported by ambulance who were confirmed later as stroke, 25 of 26 had documented glucose (96%). Of these 25 patients, only 1 had blood glucose <80mg/dL.

A Look at the Matched Data: #5

Cincinnati & Glasgow Stroke Scale

Of the 26 patients transported to the hospital who had a actual stroke (identified in CSR) the following had a documented Cincinnati Stroke Scale (CSS) or a Glasgow Coma Scale (GCS):

19 (73%) had a documented CSS
19 (73%) had a documented GCS
13 (50%) had both a CSS and GCS

A Look at the Matched Data: #6

Mode of Transportation

Of the 75 stroke patients in this study, 65% (n=49) arrived at the hospital by private vehicle.

Age Cat.	Car	Ambulance	Total
35-44	2	2	4
45-54	4	2	6
55-64	8	3	11
65-74	9	2	11
75-84	12	4	16
85+	14	13	27
Total	49	26	75

A Look at the Matched Data: #7

Primary Stroke Receiving Hospital Transports

- 100% (n=10) of patients identified with a primary impression of ‘Neurological deficit/CVA/TIA’ were transported to a primary stroke receiving hospital.

- Of the 7 patients identified with a primary impression of stroke, with a symptom onset less than 3 hours, 100% were transported to a primary stroke receiving hospital.

- Of the 2 patients identified with a primary impression of stroke, with a symptom onset between 3 and 8 hours, 100% (n=2) were transported to a primary stroke receiving hospital.

A Look at the Matched Data: #8

Percentage of patients who were diagnosed with a neurological condition upon medical discharge?

	Mode of Transport		
Description	Car	Ambulance	Total
Blank	0	1	1
Expired	4	4	8
Hospice - home	0	1	1
Inpatient rehab facility (inc. in-hospital)	5	4	9
To home, self-care (routine)	26	5	31
Transfer to a short-term general hosp. (inpatient)	1	0	1
Transfer to SNF w/ Medicare Certification	9	9	18
Transfer to custodial/supportive care facility	2	1	3
Home, w/ organized home health services	2	1	3
	49	26	75

Next Steps

- Recommend continuation of stroke patient matching project
- Identify additional hospitals to participate in project
- Continue working with hospitals to gain access to stroke registry data

- Our GOAL: to get accurate data with the least amount of work on the hospitals part!

Conclusion

Matching by first/last name is a proven method for accurate patient matching, providing reliable data driven results for participating hospitals, AMR, and EMS.

A **big** thank you to Seton and Sequoia hospitals for participating in the stroke matching project and making it a success!