SMC Stroke System Update/SMART Project Conclusions

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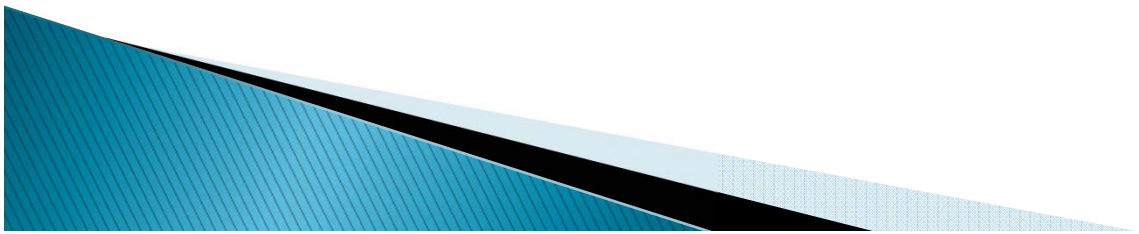
Overview

- Prehospital Stroke Care
- San Mateo County Hospital Stroke Care
- Improve Prehospital identification
- Next Steps

Prehospital Stroke Care



Stroke Identification
-Current system-

- History
  - Time last seen at baseline

- Physical Exam
  - Vital signs (heart rate, blood pressure)
  - Neurological exam (eye deviation, facial droop, motor deficit, speech deficit)

- On-scene assessment
  - Blood sugar

Cincinnati Prehospital Stroke Scale

- 3 items based on exam only:
  - Facial droop
  - Arm drift
  - Speech impairment

- Excellent reproducibility for prehospital providers for each item
- Excellent agreement between prehospital providers and physician

Cincinnati Prehospital Stroke Scale

- Published in 1999
- San Mateo County uses this scale
- Most commonly used stroke scale

- Frendl DM et al: Stroke 2009 CONCLUSION
  - Training CPSS doesn't impact paramedics' stroke identification.

Cincinnati Prehospital Stroke Scale

Original CPSS results:

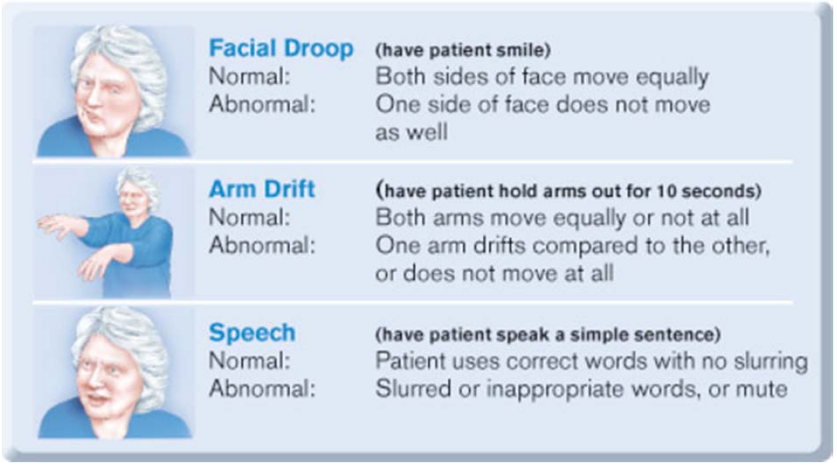
	Physicians		Prehospital Providers	
# of deficits	Sensitivity	Specificity	Sensitivity	Specificity
1	66%	87%	59%	88%
2	26%	95%	27%	96%
3	11%	99%	13%	98%

Frendl DM et al: *Stroke*, 2009

Sensitivity: 71%, Specificity: 52% out of 154 patients

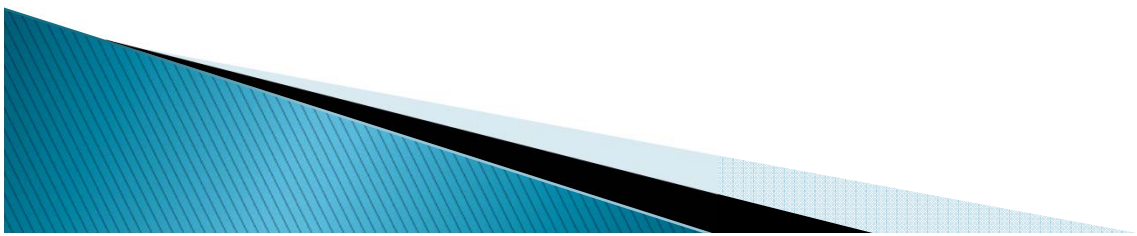
Cincinnati Prehospital Stroke Scale

- Advantages:
  - Easily learned
  - Does not require ALS skills
  - Can be performed rapidly
  - Results very reproducible



- Disadvantages:
  - Sensitivity and specificity less than desirable
  - Potentially misses posterior circulation strokes
  - Does not eliminate stroke mimics

San Mateo Hospital Stroke Care



Current SM County Policy

Destination	Onset of symptoms from baseline
Primary Stroke Center	<3.5 hours
Comprehensive Stroke Center	3.5 – 7 hours
Nearest medical facility	> 7 hours

- Paramedic identifies patient as a stroke alert if symptoms < 7 hours
- Other necessary information:
  - Time last known well
  - Deficit(s) appreciated
  - Blood sugar
  - Treatment provided
- PCR left for receiving hospital

Problems with Current System

- 40-50% of stroke alerts are mimics nationally

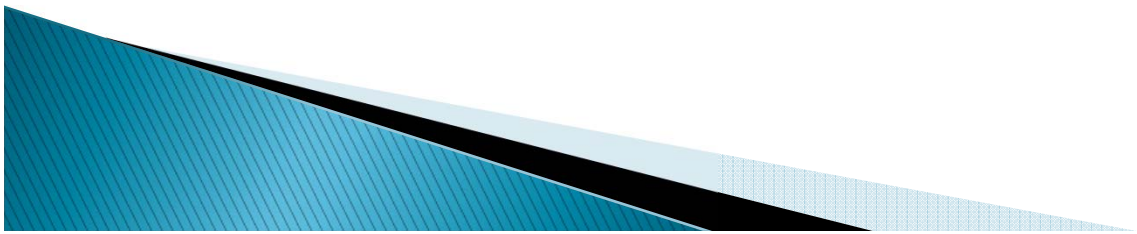
- Most diverted stroke patients are not t-PA candidates
  - Outside treatment window
  - Meet exclusion criteria for t-PA (e.g. seizure)
    - Policy doesn't screen for exclusions

Benefits and Risk of t-PA

- Minimally treated stroke – 20% improvement.
- IV t-PA candidates – 30% improvement.
  - t-PA given 2-5% in Emergency Departments
- t-PA risk – 6% intracranial hemorrhage

San Mateo Assessment Risk Tool for Stroke

SMARTS



SMARTS Pilot Project

- The San Mateo County EMS Agency and the Stroke QI Committee approved implementation of a research project studying the SMARTS Assessment Tool
- This is a formal research project approved through an Internal Review Board (IRB) at Stanford Hospital
- The SMARTS Study compares the effectiveness of stroke triage with the Cincinnati Stroke Scale and the SMARTS Tool

SMARTS– Two Goals

- Identify potential strokes better
  - Add criteria to identify stroke mimics

- Minimize diversion of stroke patients
  - Add criteria for contraindications for therapy

History/Screening Criteria (SMARTS)

Onset > 7 hours	o Yes	o No
History of seizures and on anticonvulsants	o Yes	o No
Chronically bed-ridden or wheelchair bound (baseline)	o Yes	o No
Blood sugar < 60 or > 400	o Yes	o No
Comatose or responsive only to painful stimuli	o Yes	o No
Temperature ≥ 100.4	o Yes	o No

Physical Exam (SMARTS)

Must have at least one of the following:

Unilateral facial droop	o No – both sides move equally	o Yes – one side of face is weaker
Arm drift	o No – no arm drift	o Yes – unable to move one arm or has unilateral drift
Leg drift	o No – no leg drift	o Yes – unable to move one leg or has unilateral drift
Speech disturbance – patient repeats ("The sky is blue in California")	o No – no change from baseline speech per witnesses/ patient	o Yes – Slurred or inappropriate words or unable to speak

Improve Prehospital Identification?

Results

Background about Data

- Collection started in March 2012
- Selected for all Stroke alerts
- Stroke Alerts ID'd by Stroke Coordinators
- Final Diagnosis recorded
- CPSS, blood glucose, time last seen normal
- Gender, age, t-PA use, mode of arrival
- After August, SMARTS data recorded
- Hospital activated stroke code

San Mateo County Data

- 852 Stroke Alerts since March 2012
- 546 Can Match with Hospital Data

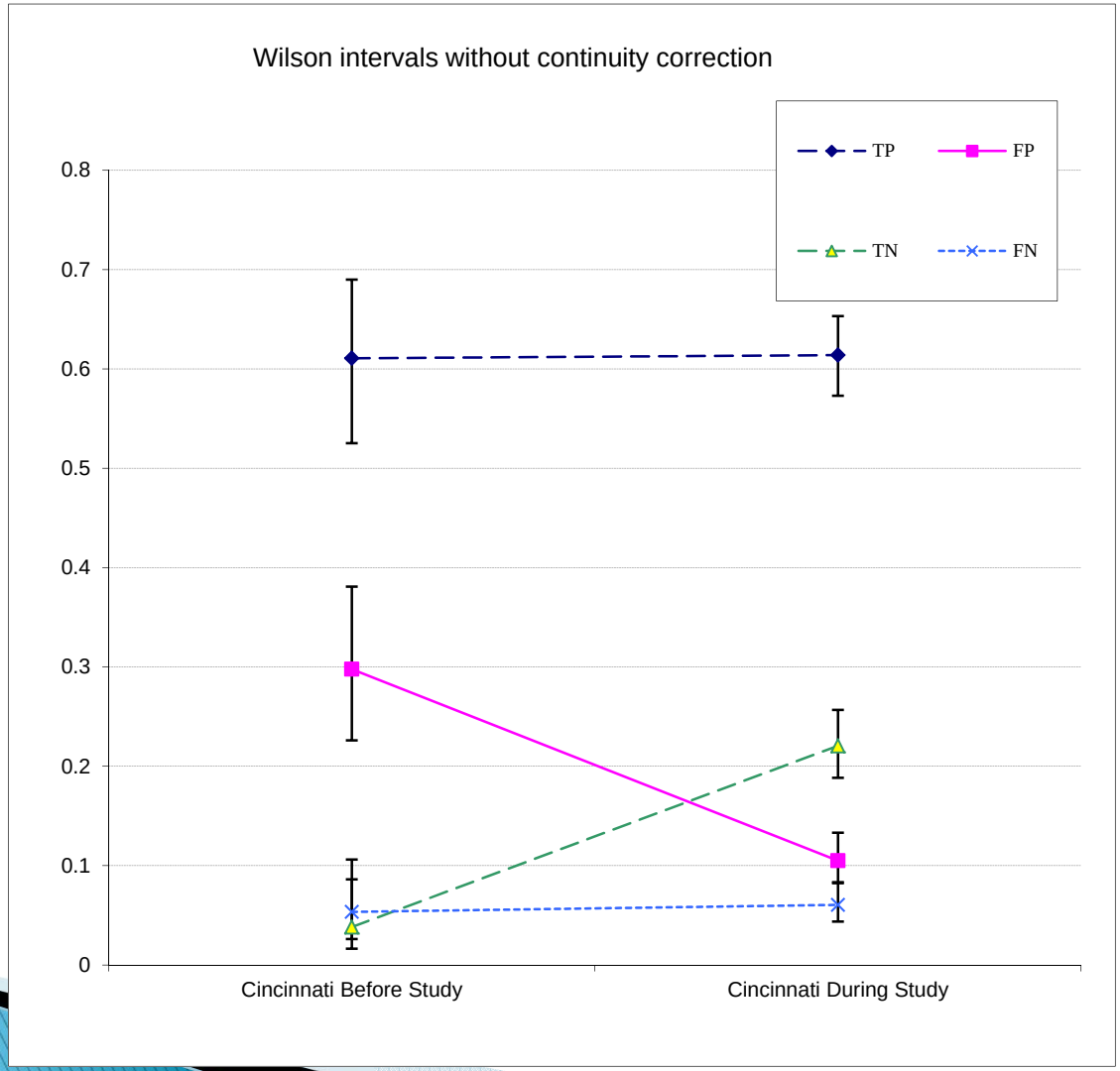
- 466 had an abnormal Cincinnati,
- 353 (75.8%) – stroke. (64.7% of all alerts)
- 113 (24.2%) – no stroke (stroke mimic)
- 78 got tPA

- Overall accuracy – 75.8%
- % Getting t-PA – 22%

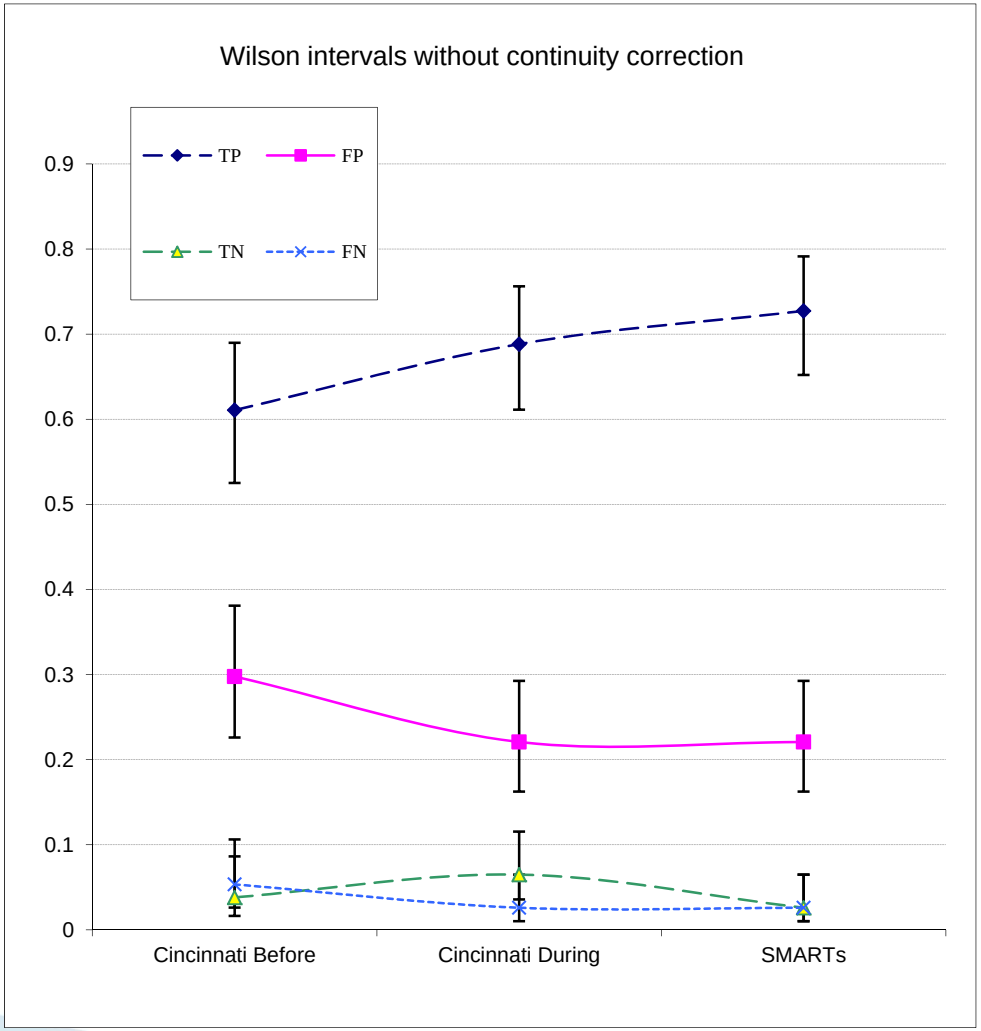
SMARTS Data

- 154 SMARTS Sheets
- 154 Have Hospital Data
- 146 Met Criteria For Stroke
- 116 Have a Stroke (TIA/Bleed/Ischemia)
- 34 Would be Triaged out
  - Of the 34, only 1 patient received TPA

Cincinnati Sensitivity/Specificity



SMARTS Sensitivity/Specificity



Next Steps

Telemedicine

- STEP-UP study
  - Grant Funded
  - mNIHSS
- Facetime
  - Exam recorded and viewed enroute
    - Neurologist
- Advantages
  - Real time feedback for paramedics
  - Neuro exam starts enroute to the ED saving time
  - Already have technology and equipment

Large Vessel Occlusions

- Biggest News in a Twenty Years for Strokes
  - tPA – 1995 – NINDS Trial
- Multiple Studies Stopped Early
  - Overwhelming Benefit
    - EXTEND
    - MR CLEAN
    - ESCAPE
- Number Needed to Treat (NNT)– 1 in 3
- EMS transfer from Primary to Comprehensive

Conclusions

- San Mateo County EMS is blessed with robust Stroke Hospitals
- Improving accuracy of prehospital notification possible
- Hospital Data Helpful for Making Decisions
- Telemedicine – On-Line Medical Direction
- EMS has a role in Large Vessel Occlusions

Thank You for your Time and Attention!