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Faculté de médecine
Faculty of Medicine

Evaluation of the Implementation of the Revised Paramedic Prompt Card for Acute Stroke Protocol

Provincial Stroke Rounds June 4th 2014



Ottawa Hospital Research Institute



Mitigating Potential Bias

- The Provincial Stroke Rounds Planning Committee mitigated bias by ensuring there was no Industry involvement in planning or education content.
- To comply with accreditation requirements of the College of Family Physicians of Canada and The Royal College of Physicians and Surgeons of Canada, speakers were provided with Declaration of Conflict of Interest forms, which were reviewed by the Ontario Regional Education Group (OREG) Host member on behalf of the Planning Committee and submitted to the NOSM CEPD Office.
- The Ontario Regional Education Group (OREG) Host member on behalf of the Planning Committee reviewed the initial presentation supplied by the speaker to ensure no evidence of bias.



Conflict Disclosure Information:

Presenter: Kristy Smaggus

Title of Presentation: Evaluation of the Implementation of the Revised Paramedic Prompt Card for Acute Stroke Protocol

I have no financial or personal relationships to disclose

Overview

- › Prehospital Care for Acute Stroke Patients
- › Bypass Protocols
- › Study Objectives
- › Methods
- › Results
- › Interpretation
- › Conclusion

Prehospital Care for Acute Stroke Patients



52% suspected stroke patients are transported by paramedics

Paramedics in Ontario play an integral role in caring for acute stroke patients

The Canadian Best Practice Recommendations

Total time from symptom onset to reperfusion for eligible patients, is usually defined as 4.5 hours.

This is broken into 2 phases: pre-hospital and ED

The pre-hospital phase, which starts with symptom onset and includes on-scene management and anticipated transport time, should be less than 3.5 hours

Patient Assessment

Environmental Assessment

Hazards, scene observations

Historical Assessment

Why was 911 called?

Primary Assessment

ABC's, Is the patient stable?

Patient history & Medical Information

Event Hx, LSN, witnessed/unwitnessed?

Presence of seizure

Past medical Hx, medications, allergies

Palliative status

Patient Assessment

Vital Signs

GCS

RR, HR & rhythm, BP, O2 Sat

Cardiac monitoring

Blood glucose, temperature



Neurologic Assessment

Unilateral arm/leg weakness or drift

Slurred speech or inappropriate words or mute

Unilateral facial droop

Patient Treatment

Management

Oxygen

IV

Glucagon/Dextrose

Extricate & Transport Decision

Destination hospital?

Patch

Patient care enroute



Acute Stroke Bypass Protocols

1999 Regional Acute Stroke Protocol was implemented in Southeastern Ontario

2004 Provincial Paramedic Prompt Card for Acute Stroke Protocol

2011 Revised Paramedic Prompt Card for Acute Stroke Protocol

Ontario Stroke Bypass Protocol

2004

2011

PARAMEDIC PROMPT CARD FOR ACUTE STROKE PROTOCOL

Indications for Patient Transport to a Designated Stroke Centre

Transport to a Stroke Centre must be considered for patients who present with a new onset of at least one of the following symptoms suggestive of the onset of an acute stroke:

- unilateral arm/leg weakness or drift
- slurred or inappropriate words or name
- facial droop

AND

can be transported to arrive within two (2) hours of a clearly determined time of symptom onset or the time the patient was "last seen in a usual state of health".


Contraindications for Patient Transport Under Stroke Protocol

Any of the following conditions exclude a patient from being transported under Stroke Protocol:

- CTAS Level 1 and/or uncorrected airway, breathing or significant circulatory problem
- symptoms of the stroke have resolved
- blood sugar \leq 4 mmol/L
- seizure at onset of symptoms or observed by paramedic
- Glasgow Coma Scale \leq 10
- terminally ill or palliative care patient

CACC/ACS will authorize the transport once notified of the patient's need for transport under the Stroke Protocol.

Version 1.0, March 2004



NEW
Transport <3.5 hours from onset

NEW
Includes Regional or Tele-Stroke Centres

NEW
Contraindications

- Symptoms resolved before assessment
- BG <3 mmol/L
- Max transport >2 hr

PARAMEDIC PROMPT CARD FOR ACUTE STROKE PROTOCOL

Indications for Patient Redirect or Transport Under Stroke Protocol

Redirect or transport to a Designated Stroke Centre will be considered for patients who:*

Present with a new onset of at least one of the following symptoms suggestive of the onset of an acute stroke:

- unilateral arm/leg weakness or drift
- slurred speech or inappropriate words or name
- unilateral facial droop

AND

Can be transported to arrive at a Designated Stroke Centre within 3.5 hours of a clearly determined time of symptom onset or the time the patient was "last seen in a usual state of health".

*Note: A Designated Stroke Centre is a Regional Stroke Centre, District Stroke Centre or a District Stroke Centre.

Contraindications for Patient Redirect or Transport Under Stroke Protocol

Any of the following conditions exclude a patient from being transported under Stroke Protocol:

- CTAS Level 1 and/or uncorrected Airway, Breathing or Circulatory problem
- Symptoms of the stroke resolved prior to paramedic arrival or assessment**
- Blood Sugar \leq 4 mmol/L
- Seizure at onset of symptoms or observed by paramedic
- Glasgow Coma Scale \leq 10
- Terminally ill or palliative care patient
- Duration of air of hospital transport will exceed two (2) hours

CACC/ACS will authorize the transport once notified of the patient's need to redirect or transport under the Acute Stroke Protocol.

** Note: Patients whose symptoms improve significantly or resolve during transport will continue to be transported to a Designated Stroke Centre.

Version 2.0, January 2011



Evaluation of the Implementation of the Revised Paramedic Prompt Card for Acute Stroke Protocol

Funded by Ontario Stroke Network





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Study Objective

The overall goal of the study was to evaluate the impact and effectiveness of the Revised Paramedic Prompt Card for Acute Stroke Protocol within a large urban and rural region

Secondary Objectives

- | | |
|-----------------------------------|---------------------------|
| 1. Predictability | For acute stroke |
| 2. Inter-rater Reliability | Paramedic interpretation |
| 3. Safety | Adverse outcomes |
| 4. Patient Impact | Thrombolysis and outcomes |
| 5. System Impact | EMS and hospitals |

Methods

Design:

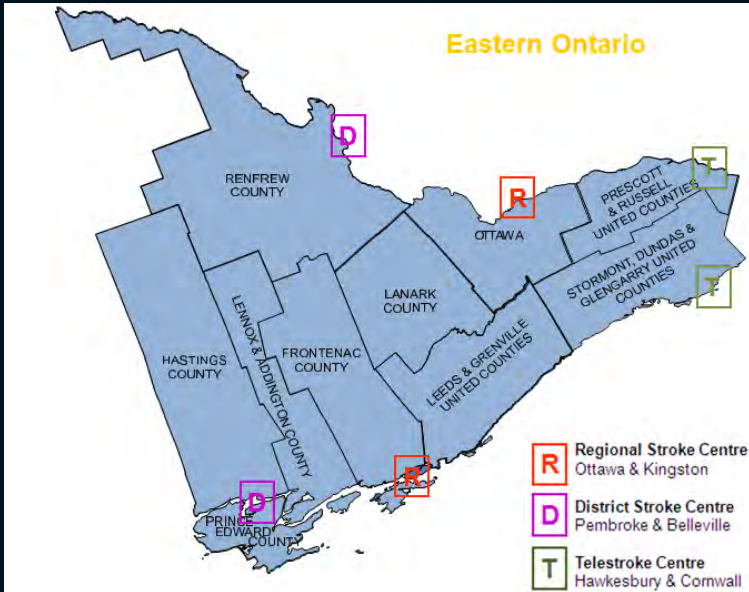
- ▶ 12-month multicentre, prospective, cohort study

Setting:

- ▶ Eastern Ontario
- ▶ 9 Paramedic services
- ▶ PCP and ACP paramedics
- ▶ 2 Regional Stroke Centres, 2 District Stroke Centres and 2 Telestroke Centres

Eastern Ontario

- 10 counties, 5 cities
- Population 1.7 million
- Area 15,000 sq. mi.
- 9 Paramedics services
- 1,000 PCPs
- 300 ACPs



Methods continued

Subjects:

- ▷ All patients evaluated by paramedics with stroke symptoms with onset >6 hours
- ▷ ≥ 16 years
- ▷ Exclude trauma

Data Collection:

- ▷ Prehospital study form - Interobserver forms
- ▷ PCR (Paramedic Call Report)
- ▷ Inhospital medical records

-Community Hospital & Stroke Centres



Training

- Professional video / Powerpoint
- Classroom / Online
- Study champions
- Service specific
- www.strokebestpractices.ca/

- Acute Stroke Protocol -

Changes to New Prompt Card

6. Max. Transport Time

- Maximum 2 hour transport time
- Extended transport times may increase the risk of potential complications or deterioration for stroke patients

Changes to Indicators:

Facial Droop
Fingerless

New Classification for Designated Stroke Centres

Standard Symptoms

Blood Glucose

Maximum Transport Time

NEW PROMPT CARD

PARAMEDIC PROMPT CARD
- ACUTE STROKE PROTOCOL

Objective: To ensure that all Paramedics are aware of the current best practice for the management of suspected stroke patients.

Background: Stroke is a leading cause of death and disability in Canada. Prompt recognition and treatment can significantly improve outcomes.

1. Recognize the stroke
2. Call for help
3. Provide early transport to a stroke centre

Indicators:

- Facial Droop
- Fingerless
- Slurred speech
- Weakness
- Paralysis

Standard Symptoms:

- Blood Glucose
- Blood Pressure
- Heart Rate
- Respiratory Rate
- Oxygen Saturation

Maximum Transport Time:

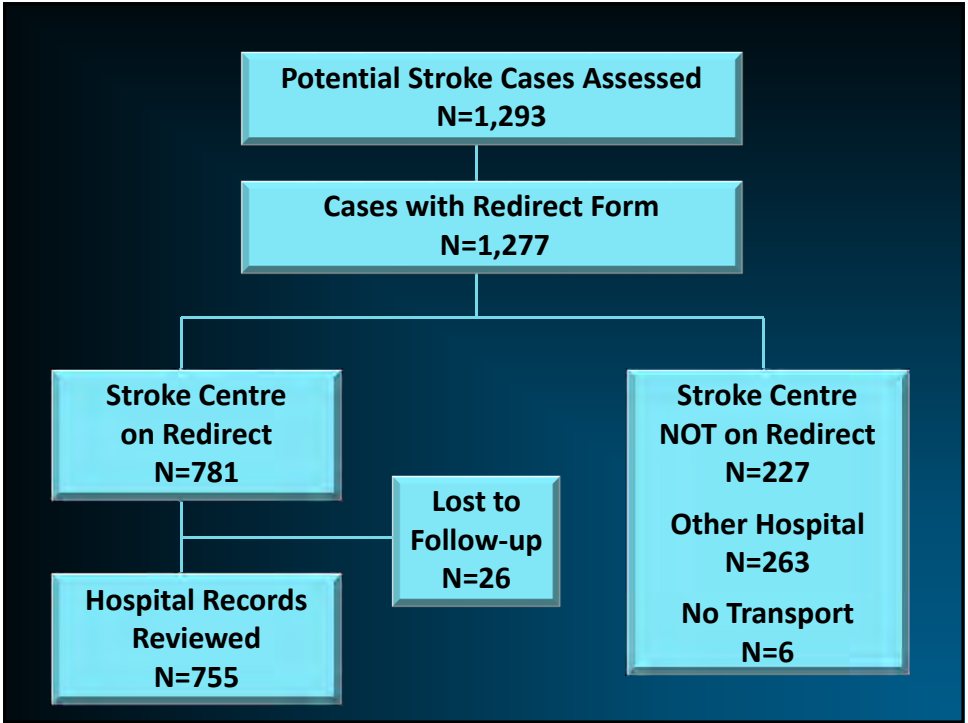
- Maximum 2 hour transport time
- Extended transport times may increase the risk of potential complications or deterioration for stroke patients



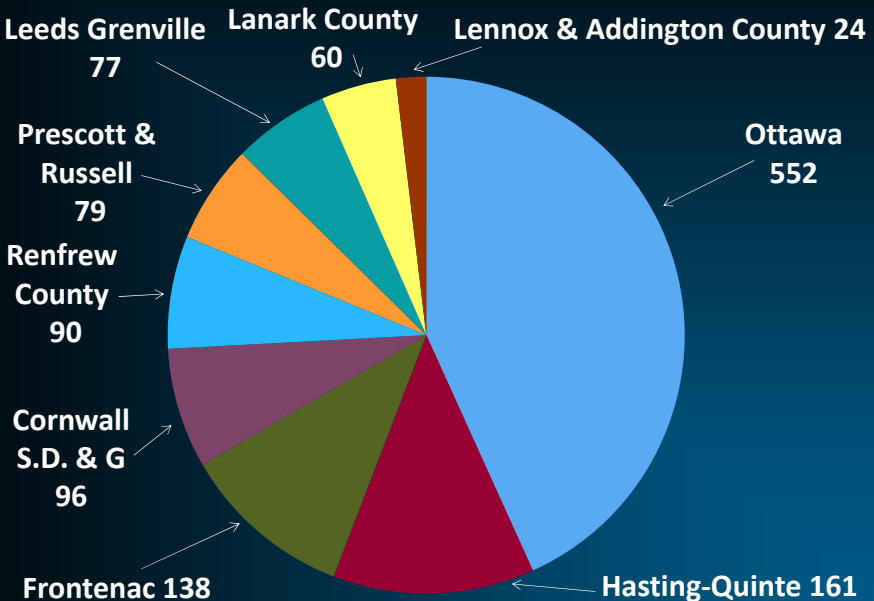
Data Form Compliance = 99%

- Paramedic service commitment
- Study champions
- Paramedic study coordinator
- Run-in
- Accessible data forms
- Feedback

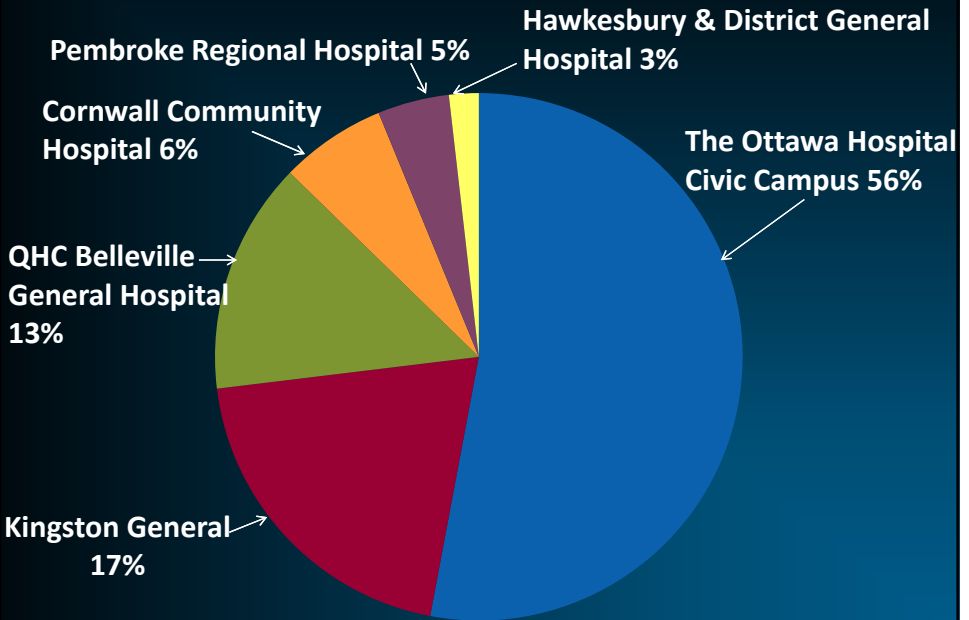




Patients Enrolled by EMS Service (N=1,237)



Destinations for Redirect Patients (N=755)



Redirect Patient Characteristics (N=755)

Age, mean	72.0 (16-101)
Male (%)	51.1
GCS, mean	13.6 (3-15)
Redirect Criteria (%)	
Unilateral arm/leg weakness	64.4%
Slurred/inappropriate speech	78.4%
Unilateral facial droop	48.5%
Can transport <3.5 hr from onset	99.7%

Time Intervals in Minutes (N=755)

Interval	Minutes	Range
Total Pre-Hospital	43.2	12 - 146
911 – Arrive Patient	11.1	0 - 38
Arrive – Depart Scene	15.6	2 - 84
Depart – Arrive Hospital	16.7	0 - 92
<30 min	84.9%	
30-60 min	13.7%	
>60 min	1.4%	

Kappa Values for Redirect Criteria (N=414)

	Kappa
Unilateral arm/leg weakness or drift	0.90
Slurred/inappropriate speech or mute	0.83
Unilateral facial droop	0.89
Can transport <3.5 hours of onset	0.56
Contraindications (7)	0.86-1.0
Meets redirect criteria	0.94

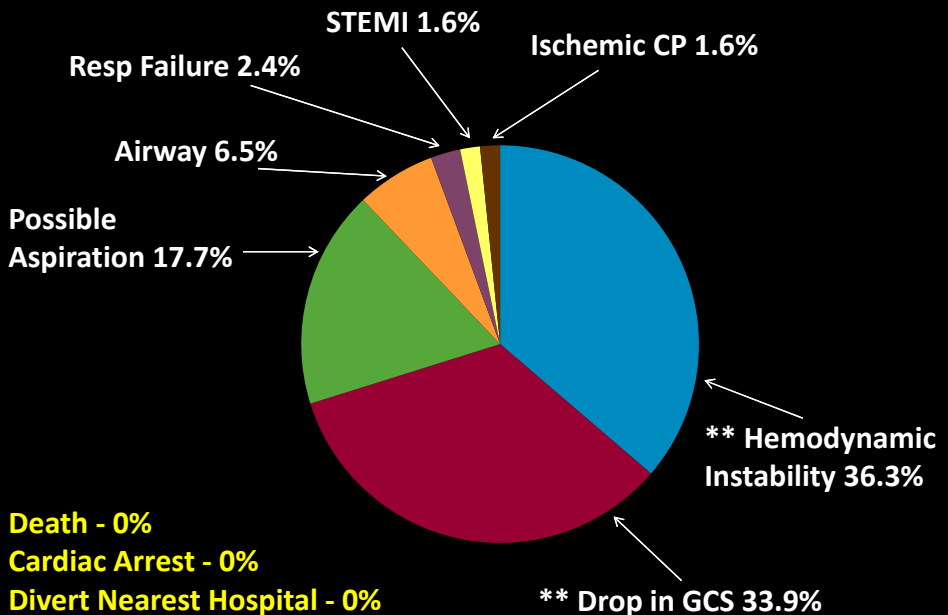
Accuracy of Paramedic Interpretation of Redirect Criteria (N=1,277)

Paramedic	Official	
	Yes	No
Yes	760	19
No	18	480

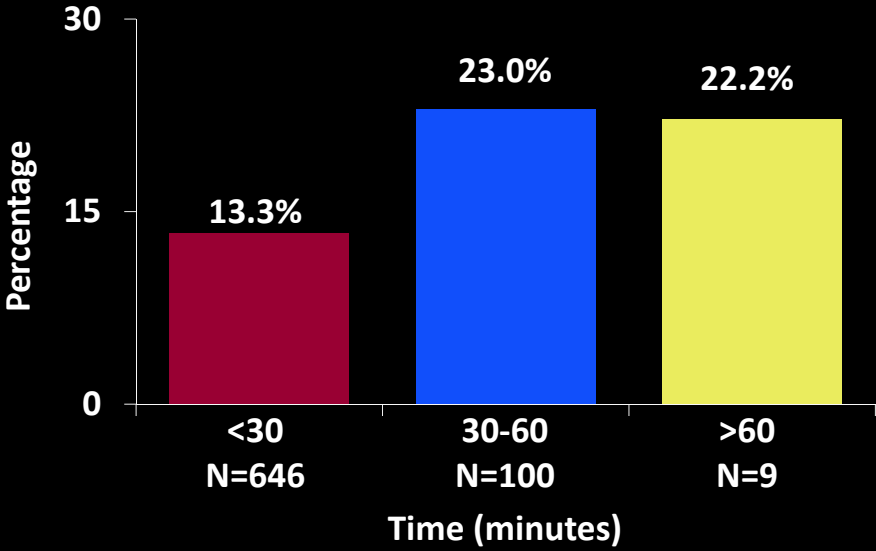
Accuracy 97.9%

- symptoms resolved
- GCS <10

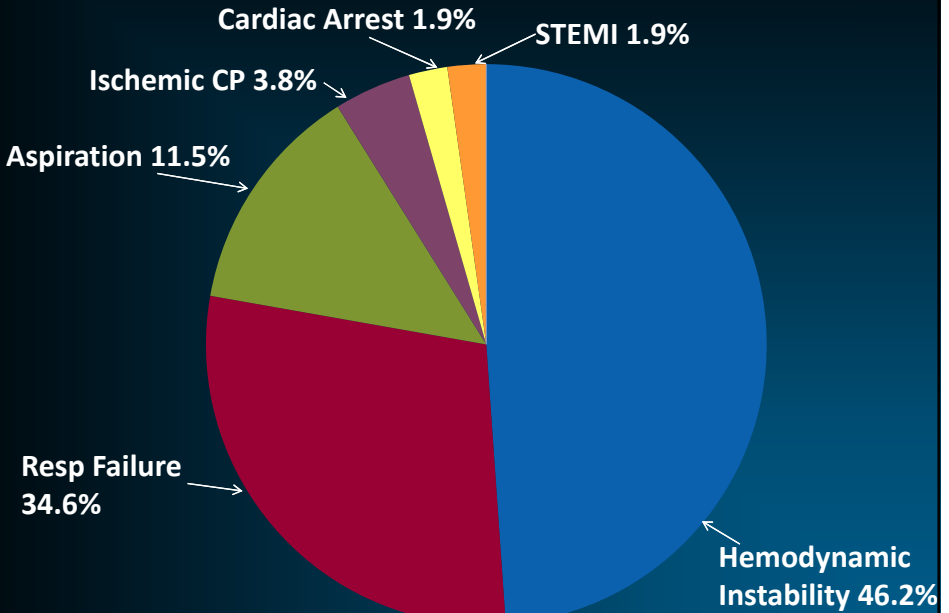
Pre-hospital Adverse Events N=111 (14.7%)



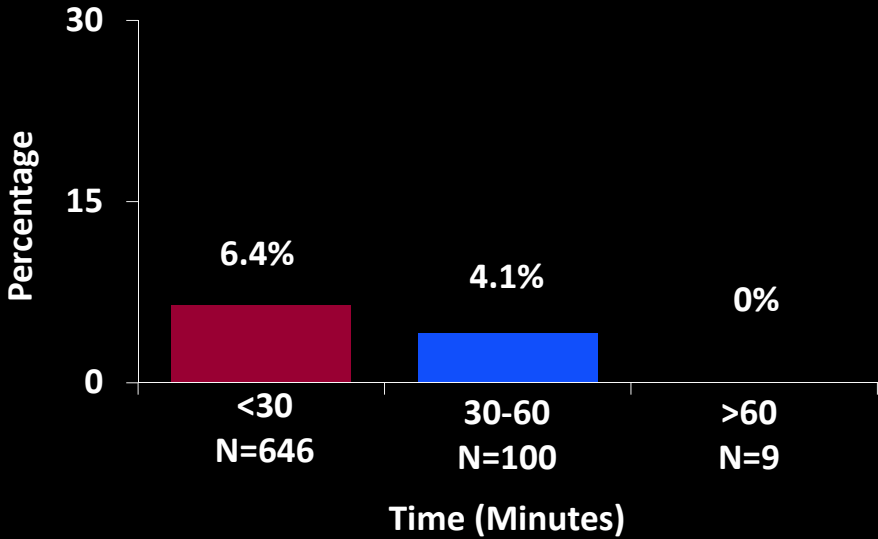
Pre-hospital Adverse Events by Times "Depart Scene to Arrive ED"



ED First Hour Adverse Events (N=45)



ED First Hour Adverse Events by Times Depart Scene to Arrive ED



Hospital Characteristics & Outcomes (N=755)

GCS - mean	13.8 (3-15)
NIH Score - mean	8.7 (0-30)
Stroke Code (%)	71.4%
Thrombolysis (%)	23.8%
Major Bleeding	1.3%
ED Disposition (%)	
Admitted	69.3%
Discharged	27.1%
Repatriated	2.7%
Died in ED	0.9%
Survival to Discharge (%)	87.3%
MRS at Discharge – mean	2.3 (0-6)

Final Diagnoses (N=755)	
Stroke	52.2%
Ischemic	45.0
Hemorrhagic	7.0
Subarachnoid Bleed	0.1
TIA	18.4%
Non-Stroke	29.3%
Other	13.6
Other Neurological	8.6
Seizure	4.2
Cardiac	0.9
Metabolic	0.8
Septic	0.7
Respiratory	0.4

Positive Predictive Values of Redirect Criteria (N=755)

Stroke Code Activation	71.4%
Thrombolysis	23.8%
Admitted to Stroke Centre	69.3%
Final Diagnosis Stroke/TIA	70.6%

Classification Performance for Thrombolysis in one City (N=189)

		Thrombolysis	
		Yes	No
EMS Redirect	Yes	33	99
	No	0	59

Sensitivity 100%
Specificity 37.3%

Classification for Final Diagnosis Stroke in one City (N=189)

		Diagnosis Stroke	
		Yes	No
Stroke Redirect	Yes	62	68
	No	10	49

Sensitivity 86.1%
Specificity 41.9%

Before and After Comparison

	2010-11	2011-12
Stroke Redirect Cases	539	755
Thrombolysis	143	175
Admitted Stroke Centre	414	523
Final Dx Stroke/TIA	493	533

Results Summary

- › Enrolled 1,277 eligible patients with 99% paramedic compliance in form completion
- › 755 patients met redirect criteria: mean age 72.0, mean time scene-to-hospital 16.7 min (15.1% >30 mins)
- › Prehospital adverse event rate was 14.7% (23.0% for those with transport time >30 mins)
- › At the hospital, 23.8% received thrombolysis, 69.3% admitted, 87.3% survived to discharge with mean modified Rankin Score 2.3

Results Summary Continued

- › Paramedics showed 97.9% accuracy in interpreting the criteria
- › Excellent inter-rater agreement with kappa value 0.94 for need to transport to a stroke centre
- › Positive predictive values for the Protocol were stroke code activation 71.8%, thrombolysis 23.2%, admitted 69.3%, and final diagnosis stroke/TIA 70.6%
- › Including all patients assessed within one city, the Protocol classified need for thrombolysis with sensitivity 100% and specificity 37.3%

Discussion

- › **Paramedics**
 - › Excellent compliance
 - › Excellent accuracy and reliability
- › **Safety**
 - › Few long transports
 - › No lethal adverse events
- › **Redirect Criteria**
 - › Very good positive predictive values
 - › First study to evaluate specificity
- › **Patients**
 - › More thrombolysis
- › **System**
 - › Not overburdened

Conclusions

- › In a large urban-rural area with 9 paramedic services, we demonstrated accurate, safe, and effective implementation of the revised Paramedic Prompt Care for Acute Stroke Protocol.
- › These guidelines will allow more stroke patients to benefit from early treatment

We thank the participating Paramedic services and their paramedics for invaluable help with our study !

