

# Emergency Stroke Care: Practical Tips for Implementation of Current Recommendations

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# Disclosure Statement

- I have no financial interest or affiliation with any corporate organizations or manufacturers of the products or drugs mentioned in this presentation.
- I am an ACLS course director and receive income from ACLS courses

# Emergency Stroke Care 75 minutes

- Going to talk about practical implementation of program goals for emergency care
- Patient education, EMS, ED, Stroke Code
- Prevention, rehabilitation, and other aspects covered later.

# Stroke Recognition and Dissemination to General Public

- 50,000 strokes per year in Canada
- One stroke every 10 minutes
- 300,000 Canadians living with the effects
- Third leading cause of death in Canada
- Children and Adults both affected

Statistics Canada, CANSIM Table 102-0529: Deaths, by cause, Chapter IX: Diseases of the circulatory system (I00 to I99), age group and sex, Canada, annual (number), 2000 to 2006. Released May 4, 2010.

## For Every 100 people with CVA

- 10 recover fully
  - 25 have minor disability
  - 40 have moderate to severe disability
  - 10 need long term care for disability
  - 15 die
- 
- 4 billion dollars/year and 3 million hospital days (2000 stats) in Canada

# Public Recognition and Response

- First step may be the most important
- Most people do not present to ED within a treatment window of 4.5 hours
- Public awareness has been linked to specific interventions with advertising
- Currently 2% of strokes get TPA

Hacke W, Kaste M, Bluhmki E, et al; ECASS Investigators. Thrombolysis with alteplase 3 to 4.5 hours after acute ischemic stroke. *N Engl J Med* 2008;359:1317-29.

Kleindorfer DLC, White G, Curtis T, Brass L, Koroshetz W, Broderick JP. National US Estimates of rt-PA Use: ICD-9 Codes Substantially Underestimate. *Stroke*. 2008;39(3):924-8.

# Need to teach patients!

- Who can have strokes?
- What are the symptoms?
- What to do? When to do it?

# Who Can have strokes?

- Public education should include information that stroke can affect persons of any age from newborns and children to adults and be aware of the benefits of early medical attention [Evidence Level C]

<http://www.strokebestpractices.ca/index.php/public-awareness-of-stroke/symptom-recognition-and-reaction/>

# What are the symptoms?

- Most people don't know the symptoms
- Keep it simple
- If taught, around 3/4 of patients may be able to name at least 2 warning signs of stroke
- Advertising works to teach, but studies show that the number

# Hickey et al

- Irish patients less than 50% aware of stroke signs and symptoms
- Target high risk groups with early stroke symptom information
- Showed that people don't know warning signs

Hickey, A., O'Hanlon, A., McGee, H., Donnellan, C., Shelley, E., Horgan, F. & O'Neill, D. Stroke awareness in the general population: knowledge of stroke risk factors and warning signs in older adults. *BMC Geriatrics*, 2009; 9(1): A35.

# New York State Department FAST

- F - Face Drooping
  - A - Arm Weakness
  - S - Speech slurred
  - T - Time to call 911
- 
- Simple and captures most strokes. Didn't look at sustained knowledge.


Jurkowski, JM., Maniccia, DM., Spicer, DA., & Dennison, BA. Impact of a multimedia campaign to increase intention to call 9-1-1 for stroke symptoms, upstate New York 2006-2007. *Preventing Chronic Disease*, 201; 7(2): A35.

Kleindorfer DO, Miller R, Moomaw CJ, et al. Designing a message for public education regarding stroke: Does FAST capture enough stroke? *Stroke* 2007;38: 2864-8.

# Heart and Stroke Media Campaign 2009 Canada






- 2009 57% of Canadians after campaign could site 2 warning signs (up from 50%)
- Small effect sustained 6 months later.

**STROKE WARNING SIGNS AND ACTIONS**

 HEART & STROKE FOUNDATION  
Finding answers. For life.

Stroke is a medical emergency. Recognizing and responding immediately to the warning signs of stroke by calling 9-1-1 can significantly improve survival and recovery. Only 20% to 25% of those who have a stroke actually get emergency care and treatment within three hours of the onset of symptoms – the critical time frame during which clot-busting drugs are most effective.

**SIGNS**

	<b>Weakness</b> Sudden loss of strength or sudden numbness in the face, arm or leg, even if temporary.
	<b>Trouble speaking</b> Sudden difficulty speaking or understanding or sudden confusion, even if temporary.
	<b>Vision problems</b> Sudden trouble with vision, even if temporary.
	<b>Headache</b> Sudden severe and unusual headache.
	<b>Dizziness</b> Sudden loss of balance, especially with any of the above signs.

**ACTION**  
If you experience any of these symptoms, CALL 9-1-1 or your local emergency number immediately.


This booklet has been independently researched, written and reviewed by the Heart and Stroke Foundation and is based on scientific evidence.

[www.heartandstroke.ca](http://www.heartandstroke.ca)

# Signs of Stroke AHA (Wallet Card)


- **Weakness** - Sudden loss of strength or sudden numbness in the face, arm or leg, even if temporary.
- **Trouble speaking** - Sudden difficulty speaking or understanding or sudden confusion, even if temporary.
- **Vision problems** - Sudden trouble with vision, even if temporary.
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# Hodgeson et al

- Recognizing at least 2 stroke warning signs is used as a marker for awareness
- 52% to 72% with ads
- Increase in fast ER stroke presentations
- Worked well for TIA
  
- Effect falls off after campaign

## What should patients do?

- Public education on stroke should emphasize that stroke is a medical emergency and that immediate medical attention should be sought.
- All members of the public should know how to take the appropriate action—that is, to call 9-1-1 or their local emergency number [Evidence Level B]

## Mosley et al

- Patient delay in calling 911
- 50% called within 1 hour
- 40% recognized could be a stroke
- Fastest in those with speech problems, family history of stroke, and being with another person at onset.
- Shows that lots of work to do.

# AHA Council on Cardiovascular Nursing and Stroke Council

- Messages showing the benefits of not delaying more effective than fear messages

Moser DK, Kimble LP, Alberts MJ, et al. Reducing delay in seeking treatment by patients with acute coronary syndrome and stroke: a scientific statement from the American Heart Association Council on Cardiovascular Nursing and Stroke Council. *Circulation* 2006;114:168-82.

# Can be EMS / Media / School / Practitioner Based education

- Efforts need to be increased
- Evidence from EMS based, advertising and other sources
- Heart and Stroke wallet cards

Tadras, A., Crocco, T., Davis, SM., Newman, J., Mullen, J., Best, R., Teets, A., Maxwell, C., Slaughter, B., & Teeter, S. Emergency medical services-based community stroke education: pilot test from a novel approach. *Stroke*, 2009; 4(6): 2134-2142.

*Fogle CC et al.* Impact of media on community awareness of stroke warning signs: a comparison study. *J Stroke Cerebrovasc Dis.* 2010 Sep-Oct; 19(5):370-5. Epub 2010 May 15.

# Summary

- Target at risk population
- Keep simple the message (H&S vs FAST)
- Advertising works, retention partly sustained
- Wallet cards, EMS, primary care can all help with messaging
- Need to do this first as 2% of patients getting acute stroke care in some studies.

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- Critical EMS assessments and actions**
- Support ABCs; give **oxygen** if needed
  - Perform prehospital stroke assessment (Table 1)
  - Establish time of symptom onset (last normal)
  - Triage to stroke center
  - Alert hospital
  - Check glucose if possible

## Next step

- Patient & EMS needs to treat as emergent
- Time is brain
- EMS needs to get them to the right place at the right time if they have a time sensitive issue

# EMS Priorities

- Immediate contact with emergency medical services (e.g., 911) [Evidence Level B]
- The emergency medical services system must categorize patients exhibiting stroke as high priority [Level C]
- Paramedics should use acute stroke out-of-hospital diagnostic screening tool [Level B]
- Out-of-hospital management should be optimized for acute stroke patients [Level A].
- Transport Protocols must be in place to most appropriate stroke care centre [Level C].
- Direct Transport Protocol criteria must be based on (1) the local emergency department performance which is recommended as being 60 minutes or less; (2) the pre-hospital phase, including symptom duration and anticipated transport time, being 3.5 hours or less; and (3) other acute care needs of the patient [Level B].
- Paramedics should obtain a history of the stroke event, including time of onset, signs and symptoms, and previous medical and drug history from the patient if able or informant when available [Level C].
- Paramedics must notify the receiving facility of a suspected acute stroke patient so the facility may prepare for patient arrival [Level C].
- Transfer to receiving facility personnel must occur without delay [Evidence Level C].
- Patients who are considered ineligible for time-sensitive thrombolytic therapy should be transported to the closest emergency department which provides access to neuroimaging and stroke expertise for assessment and initiation of secondary prevention management [ Level C]

# Dispatch

2



## Critical EMS assessments and actions

- Support ABCs; give **oxygen** if needed
- Perform prehospital stroke assessment (Table 1)
- Establish time of symptom onset (last normal)
- Triage to stroke center
- Alert hospital
- Check glucose if possible

- 911 symptoms don't recognize stroke well
- Heart and Stroke recommends air transport systems to reduce long transport times
- Prehospital delays in the treatment of stroke patients, including identification of stroke as a medical emergency, represent a significant and preventable obstacle to optimal stroke care.<sup>20</sup>

# EMS Triage

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## Critical EMS assessments and actions

- Support ABCs; give **oxygen** if needed
- Perform prehospital stroke assessment (Table 1)
- Establish time of symptom onset (last normal)
- Triage to stroke center
- Alert hospital
- Check glucose if possible

- ABCs oxygen
- Check glucose en route
- Establish time of onset within 3.5 hours
- Use a Stroke Screening Tool

# Stroke Screening Tools

- The Los Angeles Prehospital Stroke Screen (LAPSS) is a one-page instrument designed to allow prehospital personnel to rapidly identify acute stroke patients in the field.
- The Cincinnati Prehospital Stroke Scale (CPSS) is a three-item scale based on a simplification of the National Institutes of Health (NIH) Stroke Scale.<sup>212</sup> It uses the mnemonic, FAST (“Face”, “Arm”, “Speech”, “Time”), for rapid identification of stroke and transient ischemic attacks.
- Melbourne Ambulance Stroke Screen
- Ontario Pre-Hospital Stroke Screening Tool was determined in a retrospective study at a large Canadian regional stroke centre.<sup>214</sup>
- Variable PPV in determining stroke... sensitivity/specificity trade off.

**Critical EMS assessments and actions**

- Support ABCs; give **oxygen** if needed
- Perform prehospital stroke assessment (Table 1)
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# EMS LA Motor used for Triage

- Los Angeles Motor Scale Components

# The Ottawa Hospital

- EMS arrival at scene determines if pt can get to TOH within 3.5 hours from ALL cities around ottawa
- All go directly to The Ottawa Hospital and bypass all local hospitals
  - BP if not Candidate
    - Treat 220/120 target 25% drop in 24 hours
    - Often waiting short time will see drop in BP
    - Rarely treated in ER if not a TPA candidate

## For Rural Areas with 4.5 hour window

- Air Response Helpful

# Pre-Alert Stroke Code

- All suspected strokes within 3.5 hour window should be brought to highest level stroke centre capable of CT, TPA and with stroke unit if possible
- Need to Pre-Alert similar to trauma
- ED physician, nursing, registration clerk and PORTERS all at arrival of patient.
- CT ready for patient and lab aware to run all labs immediately

# Practical Tips

- Team prealert essential
- Stroke bed with weight
- Don't let residents examination/history delay the CT or bloods. Use preprinted exam/NIH
- Porters essential part of the team
- Give the decision to treat to neurology when possible

**Stroke Team does NOT take 60 minutes!**

## ER Care

- ED physician, nursing, registration clerk and PORTERS waiting... no offload delay
- RNs start with vitals and get bloods, IV if not already started en route by EMS
- ER doctor reviews history and contraindications
- Call stroke code if appropriate called by EP
- CT ready for patient, and brought by porter
- Bloods brought by porter to lab directly

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**Immediate neurologic assessment by stroke team or designee**

- Review patient history
- Establish time of symptom onset or last known normal
- Perform neurologic examination (NIH Stroke Scale or Canadian Neurological Scale)

## Stroke Code Called

- Called as soon as indications met and no obvious contraindication (before CT and blood results)
- Neurology Staff and Resident arrive
- Often within minutes of arrival of patient
- They go with patient to CT and call to make arrangements for reading

## Lab and IV

- Prestamped blood test orders
- Panel is already checked off
- Lab runs stat all tests
- Should take under 15 minutes
- INR / PTT wait only for those on anticoagulation (ok if  $<1.7$ )

# Blood Pressure

- BP addressed if candidate for TPA
- IF BP > 185/110 then labetalol 10-20 mg IV over 1 minute and repeat x 1
- Monitor during TPA and repeat and start drip of 2-8 mg /minute
- Other choices and nitroprusside if diastolic > 140

# Glucose

- Deal with low glucose immediately in case it is a stroke mimic
- High glucose - May institute protocol for sliding scale for glucose  $> 10$

# CT Scanner

- Porter there to bring to CT
- Neuroradiology / Neurology review immediately
- Plain CT done to rule out bleed
- Other modalities like MRI/CTA used for specific issues (Acute clot outside 4.5 hour window)

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**Probable acute ischemic stroke; consider fibrinolytic therapy**

- Check for fibrinolytic exclusions (Tables 4 and 5)
- Repeat neurologic exam: are deficits rapidly improving to normal?

## Stroke Team Responsibilities

- Discuss risks/benefits (5% ICH/ 30% improved functional outcome)
- Even if neurologic deficits improving, proceed as usual as some will deteriorate and all of the information will be ready.
- 0.9 mg/kg (maximum of 90mg) infused over 60 minutes with 10% of the total dose administered as an initial intravenous bolus

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**Candidate**

**Review risks/benefits with patient and family.  
If acceptable:**

- Give rtPA
- No anticoagulants or antiplatelet treatment for 24 hours

# TPA administration

- Aggressive Monitor
- Start in ER
- Admit immediately to stroke unit or ICU
- Have protocol for neurologic deterioration

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- Begin post-rtPA stroke pathway
- Aggressively monitor:
  - BP per protocol (Tables 2 and 3)
  - For neurologic deterioration
- Emergent admission to stroke unit or intensive care unit

# Stroke Unit Care

- Temperature to normal
- Glucose control
- Swallow studies
- physiotherapy, occupational therapy, speech therapy
- blood pressure care
- antiplatelet therapy

# TPA treatment

- 5% will have ICH
- 1.5% angioedema
- 0.4% symptomatic bleeding
  
- Also helpful to have protocol for these

# Worry with TPA



# Loosening up Criteria

Simplified Management of Acute Stroke Using Revised treatment  
Criteria Study

Stroke 2010; 41(4) e254-393

# SMART vs Average (California Pacific Medical Centre)

# Outcomes of Relaxed Criteria



# Wake Up Strokes

- Represents 25% of ER strokes
- Interesting subset who are excluded from care
- Data looking at treatment despite not having hard time of onset
- Treatment with TPA leads to higher mortality but not far from that of carotid endarterectomy

# Telestroke Program

- Some huge geographic areas to cover in Ontario
  - Several Hospitals with CT but no Neurologist
  - 1200 patients treated in program
  - CritiCall / ENITS systems for bleeds
- 
- **Brantford, Niagara, Kenora, North Bay, Oshawa, Peterborough, Sault Ste. Marie, Sudbury, Pembroke, and Timmins.**

# Acute TIA management strategies

- What about the minor strokes or those with TIA
- Aggressive treatment leads to better results

# Radiology / ER / Vascular / Neuro need to be on the same page

- The key to success of the programs is to get vascular surgery and neurology leading the discussion
- Radiology needs to hear from Vascular that they WILL do emergent surgery for critical carotid stenosis if it is found on doppler in the right patients. This is key!

# Need to have a TIA/minor stroke follow up pathway

- Make it easy for everyone (package)
- Preprinted Doppler, EKG, Labs, ECHO, etc
- Have all numbers, faxes and patient information available in one package.
- Should be seen in clinic same week
- Neurology needs to set this priority
- Antiplatelet, Driving, 911 if symptoms return

# Good Web References

- <http://canadianstrokestrategy.com>
- <http://www.strokebestpractices.ca>
- <http://www.heartandstroke.com>