

Stroke Recognition

Dr Matthew Rudd
ST7 Stroke / Geriatric Medicine
Northumbria Healthcare NHS
Foundation Trust

Declarations

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Aims

- Highlight the difficulties of stroke recognition in clinical pathways
- Discuss commonly used stroke recognition instruments and how they work in practice
- Introduce some important basic epidemiological concepts around stroke recognition
- Outline some tips for clinical practice and service development
- List common mimic conditions

Recognition

- By patient or bystander
- By 999 call handler
- **By face to face assessment by health professional**
 - Ambulance service
 - ED triage
 - GP / community based staff

The Challenge

- Recognising enough stroke, without overwhelming the service with large numbers of non-stroke patients
- Supporting non-specialist colleagues with diagnosis
- Stroke is a tiny proportion of pre-hospital / ED workload
- Particularly high stakes in a redirection service

What tools are commonly used by paramedics and ED triage?

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Stroke - Act F.A.S.T.



Stroke recognition instruments

- Tools to aid non-specialist recognition of stroke, usually in pre-hospital or ED setting
- Developed in thrombolysis era, US data suggesting paramedics may not identify 39% of stroke patients (Smith et al., *Pre-hospital Emergency Care* 1998)
- Use advised by RCP 2016 guidelines, NICE and American Heart Association
- No consensus on which is ‘best’

Systematic review

(Rudd *et al.*, EMJ 2016)

- All published evaluations of stroke recognition instruments up to August 2015
- Pre-hospital and hospital use
- Is it possible to determine ‘best’?
- 7 instruments identified

Identified Instruments

- CPSS (Cincinnati Pre-hospital Stroke Scale)
 - Face, arm, speech
 - “The sky is always blue in Cincinnati”
- FAST (Face, arm, speech test)
 - Face, arm, speech

Identified Instruments

- ROSIER (Recognition of Stroke in the Emergency Room)
 - Face, arm, speech, leg, visual field
 - Negative points for seizure / syncope
 - Dichotomised stroke likely or unlikely

Identified Instruments

- LAPSS (Los Angeles Pre-hospital Stroke Scale)
 - Face, arm, grip
 - Age >45
 - History of seizures or epilepsy absent
 - Symptom duration less than 24 hours
 - At baseline, not wheelchair bound or bed ridden
 - Blood glucose between 3.3 and 33.4mmol/l

Identified Instruments

- MASS (Melbourne Ambulance Stroke Scale)
 - Face, arm, (grip), speech
 - Age >45;
 - History of seizures or epilepsy absent;
 - Symptom duration less than 24 hours;
 - At baseline, not wheelchair bound or bed ridden;
 - Blood glucose between 3.3 and 33.4mmol/l

Identified Instruments

- OPSS (Ontario Pre-hospital Stroke Scale)
 - Face, arm, speech, leg
 - Can be transported to arrive **within two hours of a clearly determined time of onset**, or the time the patient was "last seen in a usual state of health";
 - Excluded if:
 - Canadian Triage and Acuity Scale level 1 and or uncorrected airway, breathing or circulatory problem;
 - Symptoms of the stroke have resolved;
 - Blood sugar <4mmol/l;
 - Seizure at onset of symptoms, or witnessed by paramedic;
 - GCS <10;
 - Terminally ill or palliative care patient.

Identified Instruments

- MedPACS (Medical Pre-hospital Assessment for Code Stroke)
 - Face, arm, leg, speech, vision
 - Prior history of seizure absent;
 - Onset within 24 hours;
 - Blood glucose between 3.3 and 33.4mmol/l

Some basic epidemiology...

- Sensitivity
 - ability to diagnose stroke correctly when stroke is present
- Specificity
 - ability to exclude stroke correctly when stroke is not present

Some basic epidemiology...

		Actual diagnosis
		Stroke
		Mimic
FAST positive	True positive	False positive
FAST negative	False negative	True negative

As a general rule...

- If you increase sensitivity, it is usually at the cost of decreased specificity
 - i.e. more strokes correctly identified, but at the cost of more mimics
 - If you increase specificity, it is usually at the cost of decreased sensitivity (more strokes missed, but fewer mimics)

Performance

- Highly variable sensitivity (ability to diagnose stroke correctly when stroke is present) and specificity (ability to exclude stroke correctly when stroke is not present)
 - E.g. FAST
 - Sensitivity varies between 79-97%
 - Specificity varies between 13-83%

Performance

- ‘Sensitivity’ in stroke recognition instrument studies
 - The product of the (paramedics) ability to detect the signs when present and the proportion of stroke patients in the studied population who have those signs

Performance

- The number of patients with stroke which is instrument detectable varies in different settings
- So the same instrument (e.g. FAST) performs differently in different settings
- E.g. applying an instrument which excludes those aged under 45 in a young population will produce poor results

Performance

- Clinical practice tells us that this is the case
 - What are the clinical characteristics of people with stroke:
 - Who arrive immediately by ambulance?
 - Who arrive in ED a couple of days later?
 - Who go and see their GP / eye casualty?
- POCS are consistently over-represented in ‘missed strokes’

Personal tips for practice and service development

- No instrument will ever allow the recognition of all stroke patients
- Need to actively support ED with patients 'refused by the stroke unit'
- Having an awareness of the clinical characteristics of who is being missed in your own service may allow refinement and targeted education

Personal tips for practice and service development

- Scales and clinical protocols excluding patients aged under 45, or “wheelchair bound / bedridden” are unlikely to be acceptable in an NHS context

Personal tips for practice and service development

- Education for non-specialist staff remains key
 - Standardisation
 - When to apply the test
 - Triage category versus ‘suspected stroke’
- The right instrument / assessment protocol depends on primary purpose, clinical setting and the consequences of getting it ‘wrong’

Personal tips for practice and service development

- No clear justification for NHS ambulance services to use anything other than FAST
 - WMAS FAST AVVV
 - Ataxia
 - Visual disturbances
 - Vertigo
 - Vomiting
 - Mimic capture rate unknown
- BE-FAST
 - Aroor et al *Stroke* 2017
 - Lacks prospective validation

Personal tips for practice and service development

- ROSIER can be justified in screening referrals from the ED to the stroke service when the population has been pre-screened by paramedics using FAST
 - Nor et al *Lancet Neurology* 2005
- Remember variability between assessors is likely to be significant for complex signs
 - Ataxia
 - Visual field defects

Personal tips for practice and service development

- Having exclusion factors in a recognition process may be flawed; a two stage screening process may be more appropriate
- A more sensitive (and time related) strategy may be appropriate when assessing for hyperacute treatments

Personal tips for practice and service development

- Common mimic conditions
 - Migraine
 - Subdural haematoma
 - Post-ictal states
 - Space occupying lesions
 - Intoxication
 - Hypoglycaemia
 - Functional decompensation in frail elderly
 - Functional neurological symptoms
 - Bell's palsy

Stroke “mimics”

- Seizures
- Syncope (low blood pressure)
- Sugar (hypoglycaemia)
- Sepsis (+ previous stroke)
- Severe migraine (if painless)
- Space occupying lesions (tumours) / SDH
- Si-chological
- *Squiffy*
- *Seniors decompensating*

Thank You