Stroke Recognition

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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**

- **FACE.** Has their face fallen on one side? Can they smile?
- **ARMS.** Can they raise both arms and keep them there?
- **SPEECH.** Is their speech slurred?
- **TIME.** Time to call 999 if you see any single one of these signs.
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 33.4 mmol/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 33.4 mmol/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...

<table>
<thead>
<tr>
<th>Actual diagnosis</th>
<th>Stroke</th>
<th>Mimic</th>
</tr>
</thead>
<tbody>
<tr>
<td>FAST positive</td>
<td>True positive</td>
<td>False positive</td>
</tr>
<tr>
<td>FAST negative</td>
<td>False negative</td>
<td>True negative</td>
</tr>
</tbody>
</table>
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