MANAGEMENT OF ISCHEMIC STROKE

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Stroke is treatable!

• Acute ischemic stroke
  – is one of the commonest neurological emergencies
  – has a high associated mortality and dependence rate
  – can be treated

• Neurologists should be competent to manage acute ischemic stroke from emergency admission to hospital discharge
World Stroke Organization Global Stroke Services Guidelines and Action Plan

Levels of Health Service Capacity for Stroke Care*

Advanced Stroke Care Services

Essential Stroke Care Services

Minimal Health Care
### Health services capacity for stroke care checklist

<table>
<thead>
<tr>
<th>Advanced stroke services</th>
<th>Essential stroke services</th>
<th>Minimal healthcare services</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Access to advanced diagnostic services</td>
<td>- Access to basic diagnostic services – laboratory, ECG, CT scan, ultrasound</td>
<td>- Variable access to healthcare workers (nurses or lay workers)</td>
</tr>
<tr>
<td>- Access to physicians with stroke expertise</td>
<td>- Access to nurses</td>
<td>- Very limited access to physicians</td>
</tr>
<tr>
<td>- Access to advanced interventions in addition to tPA, such as interventional radiology and neurosurgery</td>
<td>- Access to physicians, although may not be stroke specialists</td>
<td>- No access to diagnostic services or hospital care</td>
</tr>
<tr>
<td>- Access to specialist rehabilitation therapists</td>
<td>- Access to acute thrombolysis with tPA</td>
<td>- Limited access to the most basic lifestyle preventative advice</td>
</tr>
<tr>
<td>- Access to community programs for recovery after stroke</td>
<td>- Access to elements of stroke unit care, including members of an interdisciplinary stroke team</td>
<td>- Care provided in local communities without coordination across defined geographic regions</td>
</tr>
<tr>
<td>- Fully coordinated stroke care provided across geographically discrete regions</td>
<td>- Access to rehabilitation services</td>
<td>- Limited coordinated stroke care provided across geographically discrete regions</td>
</tr>
<tr>
<td>- Access to stroke prevention therapies such as aspirin, lifestyle change recommendations, blood pressure management</td>
<td>- Limited coordinated stroke care provided across geographically discrete regions</td>
<td></td>
</tr>
</tbody>
</table>

*These checklists should be used for self-assessment and for stroke services planning. The goal is to achieve as many checkmarks as possible and continually strive to provide the highest level of stroke services that is realistically and reasonably attainable, given local and regional resources and circumstances.

CT, computed tomography; ECG, electrocardiogram; tPA, tissue plasminogen activator.
ACUTE STROKE CARE

Scenario 1

• Rural community with a visiting health worker
  – Limited access to physicians
  – Variable access to health workers
  – No access to diagnostic tests or hospital care
  – Access to internet
ACUTE STROKE CARE

Scenario 2 – minimum health care services

• Community with health clinic
  – Limited access to physicians
  – Variable access to health workers
  – Limited access to diagnostic tests or hospital care
  – Variable access to medication
  – Access to internet
ACUTE STROKE CARE

Scenario 3 – essential stroke services

• Community hospital with access to essential stroke services
• (Primary stroke center)
ACUTE STROKE CARE

Scenario 3 – essential stroke services

• Community hospital with access to essential stroke services
• (Primary stroke center)

• Basic diagnostic tests
  – Lab, ECG, CT
  – Ultrassound (echo, Doppler)

• Nurses with stroke training

• Physicians with stroke expertise

• Inpatient stroke care

• Access to rehabilitation

• Access to stroke prevention

• Stroke training program
ACUTE STROKE CARE

Scenario 4 – advanced stroke services

• Large urban hospital with advanced stroke services
• (Comprehensive stroke center)

• Advanced diagnostic services
  – MR, angiography
• Expert physicians
  – Neurologist, neurosurgeon, neuroradiologist
• Multiprofessional stroke team
• Stroke unit care
• Coordinated care intra- and between hospitals
• Coordinated referral system
• Stroke training program
CASE 1
Recognition and reaction to stroke symptoms

- 69 year old male, smoker, with hypertension and treated hypelipidemia and diabetes
- Sudden onset of left hemiparesis, facial assymetry and dysarthria while eating (1:20 am)
- Wife called 112 at 1:25
CASE 1 – rapid transportation of the stroke victim

- Wife called 112 at 1:25
- Ambulance arrived at 1:32
- Paramedics evaluation
  - Left hemiparesis and dysartria
  - BP 103-100 mmHg, pulse 63 regular, blood glucose 109 mg/dl
- Ambulance left Foz do Arelho to Santa Maria Hospital (HSM) at 2:00
- Paramedics called HSM Stroke Pathway “Via verde” mobile
- Patient arrived at HSM Emergency at 2:52
CASE 2

75 year French old male, visiting Portugal

Prosthetic mechanical mitral valve, CABG, treated hypertension and hyperlipidemia

On aspirin, sotalol and statin

Sudden onset of left hemiparesis (19:20)

112 called

Stroke pathway “Via Verde” activated

Patient arrived at HSM Emergency 1 h after onset
STROKE PATHWAY

“VIA VERDE PARA O AVC”

If stroke is suspected, how should the stroke victim or his proxy react?

If a stroke is suspected, call 112 immediately

Do not
Wait for symptoms to improve
Wait for a proxy
Call health worker

Go the nearby health centre that can provide stroke care
Ischemic stroke? Candidate for IV thrombolysis? For thrombectomy?

- Neurologist on duty
  - NIHSS – 11
  - BP 142/87
  - CT – no early infarct signs
  - CT angio – no proximal occlusion
  - No contraindications for rtPA
  - ECG premature beats
  - Started rtPA bolus at 4:30 (180m)
  - Finished perfusion at 5:27
  - NIHSS - 7
CASE 2
Ischemic stroke?
Candidate for thrombolysis/thrombectomy?

- Neurologist on duty
  - NIHSS – 14, GCS - 11
  - BP 185/95 mmHg
  - Blood glucose 144 mg/dl
  - ECG sinus rhythm
  - CTA: no proximal occlusion
  - No contraindications for rtPA
  - Started rtPA bolus 130m after onset
  - When perfusion finished - NIHSS - 14
TREATMENT OF ACUTE STROKE
hyperacute evaluation

- Examination at the ER (<30 m)
  - ABC, vital signs, time of onset or when last seen well
  - General and neurological exam
  - NIHSS
- Candidate for thrombolysis?
  - <4.5 h
  - Check list of contraindications
  - ~ body weight
- Candidate for thrombectomy?
  - <6h
  - Proximal occlusion: ICA, MCA M1
  - NIHSS > 5, ASPECTS >5
TREATMENT OF ACUTE STROKE

Stroke mimics

• Somatoform disorders
• Focal vascular seizures
• Migraine with aura
• Peripheral vertigo
• Peripheral facial palsy
• Brain tumor
• Subdural hematoma
TREATMENT OF ACUTE STROKE

hyperacute evaluation

• Blood sample (<20 m)
  – blood cell count, platelets, INR, aPPT, glucose

• ECG

• Brain CT (results <45m)

• MR DWI (alternative)
• CT Angiography (if thrombectomy possible)
"Time is brain"

Numbers needed to treat (NNT) to reach a modified Rankin score of 0-1

- NNT 4-5
- NNT 9
- NNT 14

Graph showing the odds ratio estimated by the model and the 95% CI for estimated odds ratio over time (OTT in minutes).
TREATMENT OF ACUTE STROKE
After IV thrombolysis

• Continue to monitor
  – Neurological status, BP and bleeding
• No antiplatelets or anticoagulants for 24 h
• No bladder catheterization < 30m
• Avoid nasogastric tube for 24 h
• Avoid central catheters and arterial punctures for 24 h
WHERE SHOULD STROKE PATIENTS BE ADMITTED? TO STROKE UNITS!

- **Stroke Units**
  - Save lives
  - Reduce dependency and institutionalisation
  - No longer stays, no increased costs
  - Irrespective of age, gender and stroke severity
  - Justify service reorganisation
STROKE UNITS ARE EFFECTIVE IN LOW-MIDDLE INCOME COUNTRIES

<table>
<thead>
<tr>
<th>Region</th>
<th>Stroke unit</th>
<th>Control</th>
<th>Odds ratio M-H, random (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Events</td>
<td>Total</td>
<td>Events</td>
</tr>
<tr>
<td><strong>China</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Beijing, China</td>
<td>12</td>
<td>195</td>
<td>19</td>
</tr>
<tr>
<td>Huaihua, China</td>
<td>10</td>
<td>134</td>
<td>10</td>
</tr>
<tr>
<td>Meta-analysis (8 sites)</td>
<td>27</td>
<td>862</td>
<td>71</td>
</tr>
<tr>
<td><strong>India and SE Asia</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ludhiana, India</td>
<td>24</td>
<td>201</td>
<td>95</td>
</tr>
<tr>
<td>Bangkok, Thailand</td>
<td>6</td>
<td>301</td>
<td>9</td>
</tr>
<tr>
<td><strong>South America</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Joinville, Brazil</td>
<td>9</td>
<td>35</td>
<td>12</td>
</tr>
<tr>
<td><strong>Africa</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cape Town, South Africa</td>
<td>16</td>
<td>101</td>
<td>33</td>
</tr>
<tr>
<td>Nouakchott, Mauritania</td>
<td>5</td>
<td>42</td>
<td>5</td>
</tr>
<tr>
<td><strong>East Europe/Middle East</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Istanbul, Turkey</td>
<td>37</td>
<td>352</td>
<td>69</td>
</tr>
<tr>
<td>Zagreb, Croatia</td>
<td>698</td>
<td>5450</td>
<td>1095</td>
</tr>
</tbody>
</table>
KEY COMPONENTS OF STROKE UNITS
LOW-MIDDLE INCOME COUNTRIES

Assessment and monitoring
- Medical diagnosis
- Nursing assessment and monitoring
- Treatment assessment

Acute management (first 5 days)
- Physiological management
- Manage complications
- Early mobilisation
- Acute nursing care

Multidisciplinary team rehabilitation
- Coordinated teamwork
- Linkage of nursing care with rehabilitation
- Early goal setting and rehabilitation
- Early involvement of carers

Discharge planning
- Early assessment of discharge needs
- Discharge plan involving patient and carers

Peter Langhorne, Linda de Villiers, Jeyaraj Durai Pandian Lance Neurol 2012
<table>
<thead>
<tr>
<th>Skills and training</th>
<th>Considerations in low-resource settings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Staff skills in stroke and rehabilitation; regular education in stroke and rehabilitation</td>
<td>Access existing training resources (including online materials)</td>
</tr>
</tbody>
</table>

**Multidisciplinary teamwork**

| Formal multidisciplinary team meetings once a week to discuss individual patient progress, agree treatment goals, and plan management* | Incorporate teamwork into ward-round routine |
| Close linking of nursing with other multidisciplinary team care | Staff training might be needed |
| Early rehabilitation and goal setting | Staff (and carer) training might be needed |

**Family involvement**

| Family (carers) are involved early in the rehabilitation process | Incorporate into ward-round routine |
| Family (carers) are provided with information about stroke causes, impairments, rehabilitation, recovery, and prevention | Access existing training resources (including online materials) |

**Discharge planning**

| Early assessment of discharge needs; identification of recovery goals with patient and carer | Staff (and carer) training might be needed |
| Discharge plan involving patient and carers | Carer training important |
| Rehabilitation input in home setting | Carer training important |
| | Consider telephone follow-up |

Data taken from Stroke Unit Trialists’ Collaboration and World Stroke Academy. *Some units use regular meetings of the core multidisciplinary team comprising nursing, medical, and physiotherapy staff.

Table 2: Key multidisciplinary skills, training, and communication activities
### STAFFING OF STROKE UNITS
#### LOW-MIDDLE INCOME COUNTRIES

<table>
<thead>
<tr>
<th>Professional</th>
<th>Staff complement (WTE) in the stroke-unit trials</th>
<th>Considerations in low-resource settings where staffing levels might be few</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nursing (all grades)</td>
<td>10</td>
<td>Supplement with training and involvement of family or carers in daily patient care</td>
</tr>
<tr>
<td>Medical (all grades)</td>
<td>1–2</td>
<td>Protocols of care to guide nursing staff and junior medical staff (under supervision)</td>
</tr>
<tr>
<td>Physiotherapy (all grades)</td>
<td>1–2</td>
<td>Supplement with training and involvement of family or carers in daily patient care</td>
</tr>
<tr>
<td>Occupational therapy</td>
<td>1</td>
<td>Protocols of care to allow roles to be adopted by other staff (eg, nursing, physiotherapy staff)</td>
</tr>
<tr>
<td>Speech and language therapy</td>
<td>0.5</td>
<td>Protocols of care to allow roles to be adopted by other staff (eg, nursing, physiotherapy staff)</td>
</tr>
<tr>
<td>Social work</td>
<td>0.5</td>
<td>Protocols of care to allow roles to be adopted by other staff (eg, nursing, physiotherapy staff)</td>
</tr>
</tbody>
</table>

Total staff complement in WTE for a stroke unit with **ten** beds. Staff complements represent (in WTE) all staff available (both on-duty and off-duty) per ten beds in the stroke unit. Data from Stroke Unit Trialists’ Collaboration and World Stroke Academy. WTE=whole-time equivalent.

**Table 3: Indicative staffing levels**
TREATMENT OF ACUTE STROKE
CASE 1 – SU – day 1

• Statin, continue
• Aspirin, withhold for 24 h
• Anti-hypertensives, stopped
• Swallowing testing deferred because of nausea
• Glycemia under control
  – Insulin 6-12 UI depending on blood glucose (>200 mg/dl)
TREATMENT OF ACUTE STROKE
CASE 1 – SU – day 2

• Fever & R pulmonary infection
  – Paracetamol
  – Antibiotics

• Deep venous thrombosis of the R lower limb
  – R/ LMWH
TREATMENT OF ACUTE STROKE

CASE 2 – Clinical course in the SU

• Vomited (3x)
• Swallowing test
  – Dysphagia
  – Nothing per mouth (0-24 h)
  – Nasogastric tube (> 24h)

• Fever & R pulmonary infection
  – Paracetamol
  – Antibiotics

• Sa O2 <93%
  – O2
TREATMENT OF ACUTE STROKE

CASE 2 – Clinical course in the SU

• Atrial fibrillation with high response rate (~120 p/m)
  – Amiodarone + bisoprolol

• High blood pressure
  – Bisoprolol; + Captopril
MONITORING PHYSIOLOGICAL & NEUROLOGICAL PARAMETERS

- Neurological status
- Dysphagia
- Temperature
- Fluid balance
- Glycemia

- Cardiac rate & rhythm/ECG
- Blood pressure
- Sa O2
- Coagulation
PREVENTING COMPLICATIONS

Clean hands and early mobilization

- Pneumonia
- Urinary infection
- Deep venous thrombosis
- Pulmonary embolism
- Cardiac complications
- Delirium
- Falls
- Decubitus ulcers
- Painful shoulder
- Dehydration
- Malnutrition
PREVENTING COMPLICATIONS

FALLS

• Assess the risk of falls

PRESSURE ULCERS

• Assess risk
• Early mobilization
• Frequent change in position
TREATING COMPLICATIONS

• Low/ high blood pressure
• Hypo / hyperglycemia
• Fever
• Fluid & electrolytes imbalance
• Pain, headache
• Nausea / vomiting
• Respiratory distress
• Seizures
TREATMENT OF ACUTE STROKE
HYDRATION

• Acute stroke patients are often dehydrated

• Higher risk
  – Severe strokes
  – Disturbed consciousness
  – Vomiting
  – Dysphagia
  – Fever

• IV fluids
• saline (0,9%) for 24 h
• > 24h
  – Medical and Neurological status
  – Fluid balance and electrolytes
TREATMENT OF ACUTE STROKE
NUTRITION

• Test for dysphagia
• If dysphagic, early nasogastric tube and feeding
  – Reduces mortality
• Early nasogastric tube better than early percutaneous gastrostomy
• No routine oral dietary supplements
TREATMENT OF ACUTE STROKE

Glycemia

• Hyperglycemia
  – Larger infarct size
  – Poor clinical outcome
  – Higher mortality

• Hyperglycemia in acute stroke
  – Known diabetic
  – Newly diagnosed diabetic
  – Stress hyperglycemia

Treatment

• Intermitent monitoring of capillary glycemia

• Treat
  – hyperglycemia >180 mg/dl
  – hypoglycemia <50 mg/dl

• IV fluids without glucose 24h

• Shift diabetic patients to sc insulin temporarily
TREATMENT OF ACUTE STROKE

Blood Pressure management

• Treat if
  – BP >220-120 mmHg
  – BP>185-110 mmHg, if treated with rtPA
  – Cardiac failure, aortic dissection, acute renal failure, encephalopathy

• As a rule, withhold pre-stroke anti-hypertensive drugs for a few days
TREATMENT OF ACUTE STROKE
DEEP VENOUS THROMBOSIS & PULMONARY EMBOLISM

• % DVT in hemiplegic patients
  – Clinical diagnosis ~ 1-16%
  – Doppler ~ 10%
  – MR Venography ~ 45%
  – Isotopes ~50%

• Higher risk
  – Immobilization
  – Obesity
  – Diabetes
  – Previous stroke

• Pulmonary embolism is a cause of death in acute stroke
TREATMENT OF ACUTE STROKE
DEEP VENOUS THROMBOSIS & PULMONARY EMBOLISM

• Early mobilization

• LMWH, prophylactic dosages (I-A)

• Intermittent pneumatic compression

• Graduated compression stockings
  – > DVT with below-knee than thigh-length
  – Tight-length
  • No reduction of DVT
  • More skin complications

INTERMITTENT PNEUMATIC COMPRESSION TO PREVENT DVT

How costly?

How nice
TREATMENT OF INFECTIONS

SU reduce the risk of death after stroke through the prevention and treatment of complications, in particular infections*

Clean hospital and clean hands
Safe feeding
Avoid urinary catheter
Early mobilisation
SEIZURES

• No indication for prophylactic AEDs
• Acute symptomatic seizures
  – Risk of worsening of neurological deficits
  – Risk of epileptic status
  – Check for co-morbid conditions
  – FB; PTH, CBZ or VPA
• Epileptic status
  1. Diazepam, lorazepam or midazolan IV
  2. PTH, VPA or LEV IV; FB IV
  3. Barbiturate or propofol IV, mechanical ventilation, ICU
TREATMENT OF ACUTE STROKE
Case 1 – repeated imaging?

Repeated CT
MR DWI
MR FLAIR
TREATMENT OF ACUTE STROKE
CASE 2 – Neurosurgery?

• Neurological worsening (2nd day)  
  – GCS 7-11

• 3rd day

• Mannitol

• Neurosurgical consultation
DECOMPRESSIVE SURGERY
Saves lifes

• Early <72h surgery prevents death and improves functional outcome
• Applies for R and L hemispheric strokes
• Applies for patients irrespective of age
• Posterior fossa decompression in large space-occupying cerebellar infarcts

Female, 27, TACI, dissection
DO NOT PRESCRIBE NEUROPROTECTIVE DRUGS

Other negative trials
Cerebrolysin
Citicoline

Sacco et al Lancet 2007
TREATMENT OF ACUTE STROKE

CASE 1 – an happy end

- Normal duplex and TCD
- Dilated L atrium
- No AF detected during continuous monitoring or Holter
- Atorvastatin
- Aspirin
- Continued LMWH

- Started rehabilitation
- Discharged to local hospital on the 7th day
- NIHSS – 3
- mRS – 2
- TOAST – unknown cause
- Repeat Holter: pAF
  — Oral anticoagulant
Clinical course in the Stroke Unit

- Day 3 – GCS -3
- Prognosis discussed with family
- Paliative care
- Transfered to home country
TREATMENT OF ACUTE STROKE QUALITY INDICATORS

ERS (PT)/Joint Commission

- CT
- rtPA if <4.5 h, no contraindications
- Dysphagia testing
- DVT prophylaxis
- Secondary prevention
  - Antiplatelet, statin
  - Anticoagulant if AF
  - Endarterectomy if indicated
- Physiotherapy

ESO

- CT (< 1 h)
- Admission to Stroke Unit
- rtPA if indicated (< 60 m)
- Dysphagia testing
- Secondary prevention
  - Antiplatelet
  - Statin
  - Anti-hypertensives
  - Anticoagulant if AF
  - Endarterectomy, if indicated
- Vascular imaging
ACUTE STROKE CARE

Scenario 1 – minimum health care services

• Rural community with a visiting health worker
  – Limited access to physicians
  – Variable access to health workers
  – No access to diagnostic tests or hospital care
  – Variable access to medication
  – Access to internet

• Prevention of complications
  – Fever, infections, pneumonia, DVT, skin ulcer
  – Avoid indwelling catheters
  – Assess swallowing
  – Assess hydration and nutritional status

• Early (>24h) mobilization

• Prevention of recurrent stroke
  – Aspirin, anti-hypertensive drugs

• Palliative care for devastating strokes

• Family involvement and training
  – Positioning and mobilization
  – Feeding
  – Stroke prevention
ACUTE STROKE CARE

Scenario 2 – minimum health care services

- Community with health clinic
  - Limited access to physicians
  - Variable access to health workers
  - Limited access to diagnostic tests or hospital care
  - Variable access to medication
  - Access to internet

- Prevention of complications
  - Fever, infections, pneumonia, DVT, skin ulcer
  - Avoid indwelling catheters
  - Assess swallowing
  - Assess hydration and nutritional status

- Early (>24h) mobilization
- Prevention of recurrent stroke
  - Aspirin, anti-hypertensive drugs
- Palliative care for devastating strokes
- Family involvement and training
  - Positioning and mobilization
  - Feeding
  - Stroke prevention
<table>
<thead>
<tr>
<th>Fluid and food management</th>
<th>Independent evidence of benefit</th>
<th>Considerations in low-resource settings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Careful management of fluids and food (intravenous saline in the first 12–24 h; early nasogastric tube feeding if swallowing is unsafe)</td>
<td>Indirect evidence from stroke-unit trials only</td>
<td>Needs access to basic monitoring facilities</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Monitoring and management of physiological abnormalities</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypoxia</td>
<td>Might improve early neurological recovery</td>
<td>Needs access to oxygen and oxygen monitor</td>
</tr>
<tr>
<td>Blood pressure</td>
<td>Acute reduction not usually needed</td>
<td>Based on simple clinical observations (antihypertensive intervention rarely needed)</td>
</tr>
<tr>
<td>Pyrexia (and infection)</td>
<td>Paracetamol might improve outcome if pyrexia related</td>
<td>Based on simple clinical observations and basic drug treatments Use acute-care protocol</td>
</tr>
<tr>
<td>Hyperglycaemia (&gt;10 mmol/L)</td>
<td>Part of effective acute-care protocol Intensive glucose control not needed</td>
<td>Needs blood glucose measurements and insulin Use acute-care protocol</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Swallowing management</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Identification and management of impaired swallowing</td>
<td>Dysphagia management reduces complications Part of effective acute-care protocol</td>
<td>Needs staff (and carer) training Use acute-care protocol</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Early mobilisation</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Careful positioning and handling</td>
<td>Basic protocol for positioning reduces chest infections</td>
<td>Needs staff (and possibly carer) training Basic protocol might be useful</td>
</tr>
<tr>
<td>Able to sit, stand, and walk as soon as possible</td>
<td>Might improve recovery</td>
<td>Needs staff (and possibly carer) training</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Nursing care</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Pressure-area care</td>
<td>Indirect evidence from stroke-unit trials only</td>
<td>Needs staff (and possibly carer) training; staffing levels are important</td>
</tr>
<tr>
<td>Continence management (avoid catheters if possible)</td>
<td></td>
<td>Needs access to equipment</td>
</tr>
</tbody>
</table>

Key components of early stroke management. Data from Stroke Unit Trialists’ Collaboration and World Stroke Academy.

Table 1: Basic care in a stroke unit
PREHOSPITAL & EMERGENCY CARE IN 3 DIFFERENT SCENARIOS

• Transportation to hospital
• Urgent CT
• Blood analysis
• ECG
• Evaluation by a MD trained in stroke
• Eligibility for IV rtPA (<4.5h)
• Eligibility for thrombectomy (<6h)
• Aspirin
• Hospital admission
ACUTE TREATMENT IN DIFFERENT SCENARIOS

• Prevention of complications
• Evaluation of swallowing
• Nutrition & hydration
• Prevention of DVT
• Treatment of fever
• Treatment of infections
• Avoiding indwelling catheters
• Early (>24h) mobilization
• Palliative care
ACUTE STROKE CARE

Scenario 3 to 4 – essential to advanced stroke services

• Large urban hospital upgrading stroke services
• Should be able to provide
  – Thrombectomy
  – Neurosurgery
  – Intensive care
  – Comprehensive diagnostic evaluation
REGIONAL & NATIONAL TOOLS

• Stroke awareness campaigns (prevention, recognition and reaction)
• National emergency telephone number
• Patient transportation and transfer system
• Access to internet
REGIONAL & NATIONAL TOOLS

- Hospital SOPs for stroke patients
- Stroke Units
- Stroke patient coordinated referral system
- Guidelines for stroke prevention and care
- Hospital SOPs for stroke patients
- Indicators and assessment (self and external)
Greetings from
Lisbon Academical Medical Center Stroke Unit