



LAZIOSANITÀ
AGENZIA DI SANITÀ PUBBLICA



REGIONE
LAZIO

The Lazio Stroke network

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Population and epidemiology

- Lazio Region has 5.5 million inhabitants, including the city of Rome (2.8 millions).
- In 2009, in Lazio, there were 17.876 hospital discharges (≥ 18 years old) for cerebro-vascular diseases:
 - 60 % ischemic stroke (ICD-9-CM 433, 434, 436)
 - 24 % TIA (ICD-9-CM 435)
 - 16% haemorrhagic stroke (ICD-9 - CM 430,431,432)



Italian National Health Service

- In Italy the National Health Service guarantees health care for free to all Italian citizens.
- Health services are provided by public (mostly) and private providers. Most of the privates have agreement with NHS.
- Most of the care is completely free (primary and secondary prevention, in-hospital care, primary care and GPs), only some out-patient procedure and drugs may need a participation of the citizen to the costs (with a small fixed fare). Patients with chronic conditions, older people, pregnant women and infants are exempted from the fare.

Regional Health Services

- The national government agrees with regional governments the “Essential Levels of Assistance” i.e. a positive list of what each Regional Health Service must guarantee.
- The regional governments are responsible for the implementation of the Health Service.
- The public funds are transferred from the national government to the regions and from the regions to the Local Health Units on the basis of their inhabitants.
- Hospitals are paid by the Local Health Units according to the number of discharges of their residents on the basis of DRG fares.

Background: evidence based health planning

In 2005-06 a cluster-randomised controlled trial was conducted:

Emergency Rooms (ER) and Emergency Medical Systems (EMS) were randomised to usual care or to the new clinical pathway (referring strokes to stroke unit instead of the nearest hospital).

Results: 4900 suspected ictus were randomised, 762 were eligible stroke and 290 were candidate for thrombolysis.

Patients correctly referred to stroke unit:
43% in exp vs. 14% in ctrl. RR = 3.21; 95%CI: 1.62–4.98

Patients suitable for i.v. thrombolysis who actually received it:
15% in exp. Vs. 1.9% in ctrl. (p=0.001)

Conclusion: The integration of EMS and ERs with SU networks for organised acute stroke care is feasible and ameliorate the quality of care for stroke patients.

Aims of the network

- To offer the same care to Ictus patients in the whole region, with homogeneous protocols
- To perform each procedure in the appropriate setting, increasing the efficiency of the system:
 - High complexity procedure must be performed in high level hospitals
 - Patients with a low level of complexity must stay closer to their residence
 - Rehabilitation care must be established since the first hospitalization and continuity must be guaranteed between acute and post acute care
- To enhance the continuous education of physicians and nurses dedicated to neurovascular disease
- To reduce the need of emergency transfer of patients from spoke to Hub centre through the implementation of telemedicine

Network Organisation

- **One Hub** per each Area with second level Cerebrovascular Treatment Unit (most complex patients and most complex intervention; coordination of the area-level network; training and education)
- A limited number **Spokes with first** level Cerebrovascular Treatment Units per Area;
- Several **peripheral emergency rooms** with telemedicine link with the HUB to timely perform i.v. thrombolysis and to correctly address hemorrhagic patients to surgery if needed



Legenda:

- HUB
- Spoke
- ER with neurovascula team

4 Areas with ~1.3 million inhabitants
 4 Hub (1 per area, all in Rome)
 11 Spokes
 20 ER with neuro-vascular team

Hub functions

- Management of patients with acute focal neural deficit: ischemic (<6h since symptom onset if anterior circle, <12h if posterior circle), or haemorrhagic;
- Management of stroke patients in critical conditions;
- Management of TIA patients ($\leq 48h$ since onset) with $ABCD^2 \geq 3$ (Johnston SC, Lancet 2007;369:283-92).
- Stroke specific diagnosis;
- Appropriate therapy in the acute phase (i.v. thrombolysis; neuro-surgery; vascular surgery; interventional neuro-radiology);
- Definition of protocols for the i.v. thrombolysis in Spokes and peripheral ER;
- Start of rehabilitation;
- Timely transfer to less complex care setting for the non critical patients;
- Telemedicine tutoring for Spokes and peripheral ER.

HUB requirements

- Emergency room;
- 8 beds with monitoring of vital functions;
- Multidisciplinary team expert in cerebro-vascular disease;
- H24 link with: neurosurgery, vascular surgery, radiology (Roentgen diagnostic, nuclear medicine), neuro-radiology (TC, MR, angio-MR, digital angiography, interventional neuro-radiology), ultrasounds (trans-thorax US), cardiology (Intensive Coronary Therapy Unit, pace-maker implant), intensive care
- Diagnostic and therapeutic protocols shared with medical transport system and other centres in the network
- Telemedicine for tutoring Spokes and peripheral emergency rooms

Spoke functions

Management of patients with acute focal neural deficit: **ischemic** (>6h since symptom onset if anterior circle, >12h if posterior circle), or **haemorrhagic not needing surgery**;

Management of stroke patients in **non-critical** conditions;

Management of **TIA** patients (>48h since onset) or with **ABCD2 < 3**;

Stroke specific diagnosis;

Appropriate therapy in the acute phase;

Application of the protocol for the i.v. **thrombolysis** in Spokes and peripheral ER, under telemedicine **tutoring by the Hub**;

Start of rehabilitation;

Transfer of critical patients to the Hub

Spoke requirements

Emergency room;

8 beds with monitoring of vital functions;

Multidisciplinary team expert in cerebro-vascular disease;

H24 link with TC

H12 link with: radiology (Roentgen diagnostic), neuro-radiology (MR, angio-MR, angiography);

Diagnostic and therapeutic protocols shared with medical transport system and other centres in the network

Telemedicine link with the Hub

Training and education in the Hub

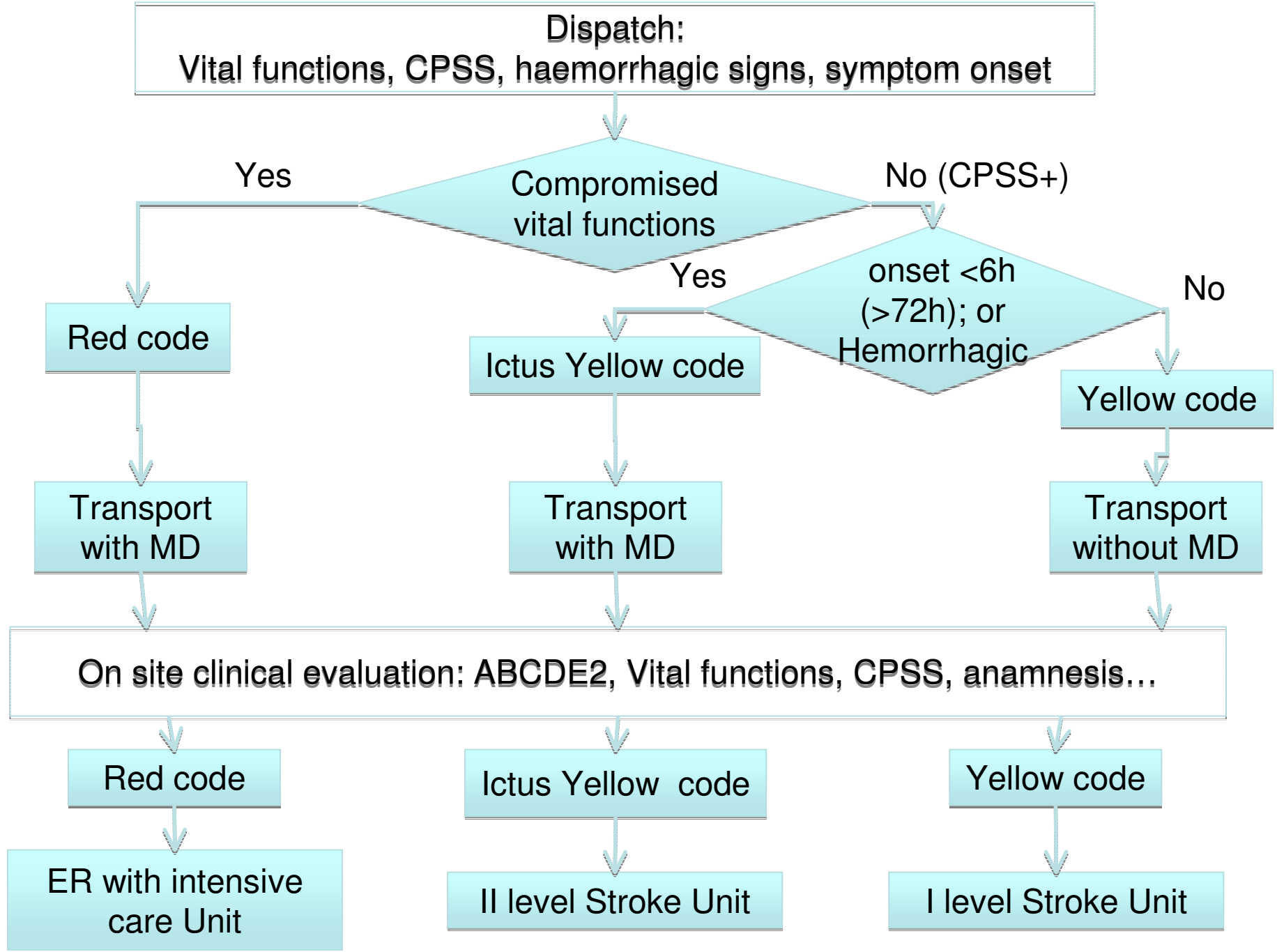
Peripheral ER functions

Only ER with **more than 25.000** visits year are included.

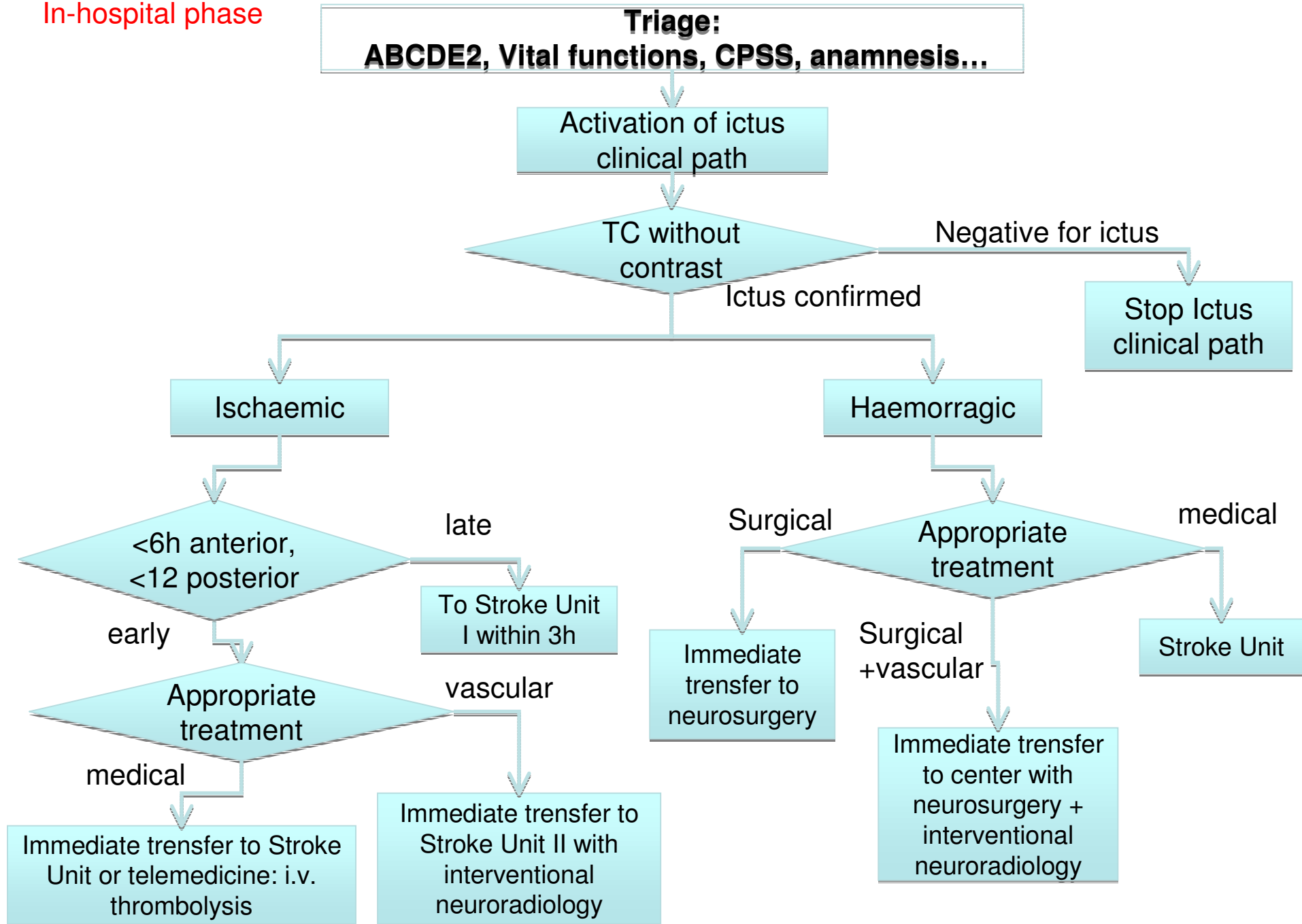
In the ER a multidisciplinary team will be trained to perform neurological examination to **correctly refer the haemorrhagic patients to neuro-surgery** and to **perform i.v. thrombolysis under telemedicine tutoring by the Hub.**

After the therapy, the ER must transfer the patient to the appropriate centre (Hub or spoke according to the patient's conditions).

Pre-hospital phase



In-hospital phase



Rehabilitation

1. It must be started 48h after hospitalization within the Stroke Unit, during acute care;
2. For patients in sub-critical conditions a sub-intensive care Unit for rehabilitation in acute care hospitals (for post coma patients);
3. The rehabilitation plan must be filled at discharge by the Hospital Evaluation Team, the plan must indicate what and where the patient must do after discharge.

Four types of post acute rehabilitations:

1. Severe acquired brain lesions Units
2. Intensive Rehabilitation Units
3. Long term residential Units
4. Home assistance

Barriers to implementation

Until now the transport and transfer of stroke patients to stroke units was limited, causing limited access to thrombolysis and neuro-surgery for the following reasons:

1. Only six stroke units activated, all of them in Rome
2. Some of the hospitals identified as Spokes did not fulfil the requirements, particularly for trained physicians, and did not implement the stroke unit
3. Interventional neuro-radiology is not h24 in all second level Stroke Unit
4. Few ambulances have the MD on board, consequently most of the ambulances refer stroke patients to the nearest ER instead to the nearest Stroke Unit
5. The availability of ambulances for hospital-to-hospital transfer is low
6. Scarce application of the clinical path protocols

Proposed Solutions

1. Less requirements, less Stroke units only in hospitals already fulfilling requirements
2. Telemedicine to train neurologists in the spokes and peripheral ERs
3. Regional plan for h24 interventional neuro-radiology
4. Telemedicine, to timely treat ischemic stroke and to correctly identify haemorrhagic stroke needing surgery in peripheral ERs
5. The ambulance without MD can transport the patient to stroke unit after authorization of the 118 (the Italian 911) coordinating centre
6. Identification of responsibilities for the implementation of intra- and inter-hospital protocols defining the ictus clinical paths, including referral to rehabilitation