KnowEMS

Co-funded by the European Union

Prehospital management of acute stroke

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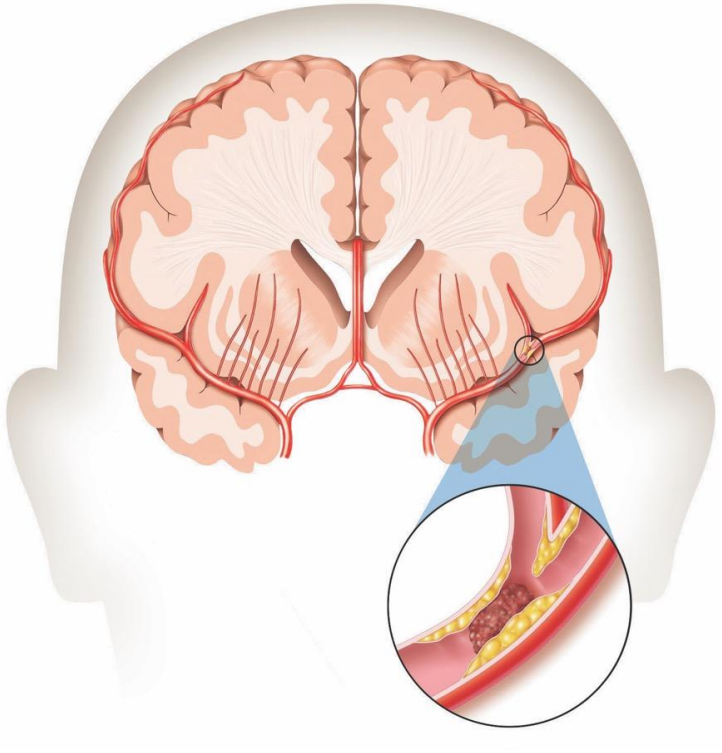
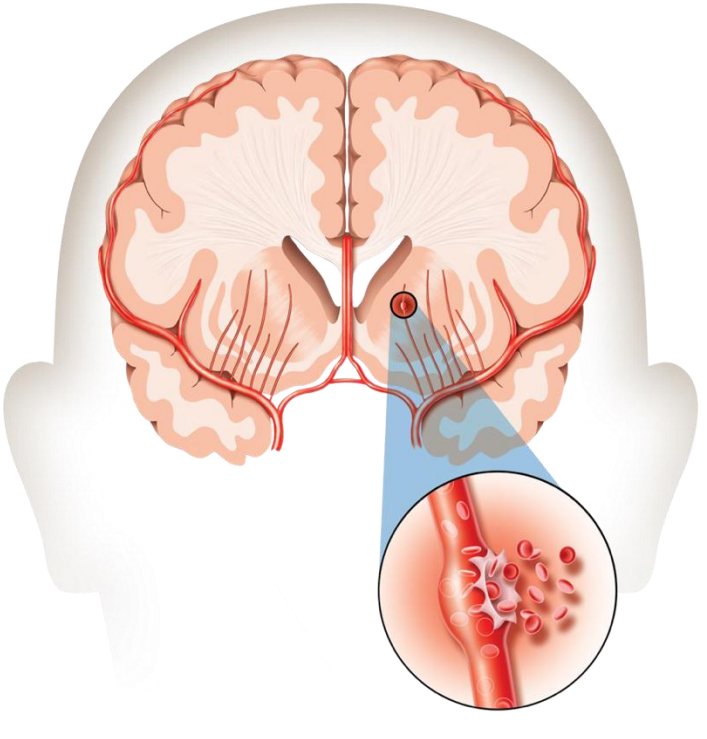
SAMUR-Protección Civil

Madrid - Spain

What is a stroke?



Ischemic Stroke



Hemorrhagic Stroke

Some facts about stroke…

- There are over **12.2 million new strokes each year**. Globally, one in four people over age 25 will have a stroke in their lifetime.
- Every year, **over 750,000 people in Europe will have a stroke – more than one stroke a minute**
- Each year, over **62% of all strokes occur in people under 70 years of age**.
- Globally, there are **over 101 million people currently living who have experienced stroke**.
- Six and a half-million people die from stroke annually.
- **Between 2015 and 2035 the number of strokes is expected to rise by 34%: f**rom 613.148 in 2015 to 819.771 in 2035.
- The total cost of stroke care was €60 billion in 2017. Future costs of stroke care in Europe could increase to €86 billion in 2040

It is a major health problem today
and will be even more so in the future!

World Stroke Organization & Stroke Alliance for Europe

Why should we care as EMS?

- Both **ischaemic and haemorrhagic strokes** are a major cause of **morbidity** and **mortality** worldwide and they have a **significant economic impact**, both in terms of direct and indirect costs.

- Frequently the **EMS are the first contact** with the health system for a patient suffering a stroke.

- **Stroke treatments are available and are effective if they are administered quickly.**

- **The stroke care strategy will depend on the type of EMS, the available resources and the location of the referral hospitals.**

PREHOSPITAL MANAGEMENT OF ACUTE STROKE

Know EMS
Co-funded by the European Union

SYMPTOMS RECOGNITION

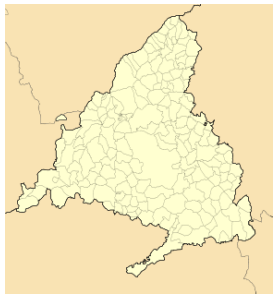
EMS CARE

MEDEVAC
TO APPROPIATE HOSPITAL

HANDOVER
(AND INTERHOSPITAL TRANSFER IF NEEDED)

< STROKE CODE. GUIDELINES. EMS CLINICAL AND OPERATIONAL SOPs >

OUR EMS...



Emergency Medical Service (EMS) of Madrid city

3.416.771 habitants (2024)
+ tourists
+ people who live outside Madrid City and work or study in Madrid City.

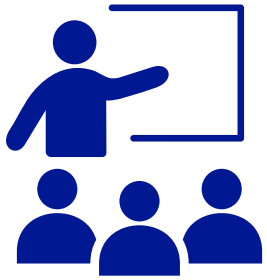
SERVICES

- **Emergency medical care on streets and in public places in the city of Madrid.**
- **Emergency medical care and Civil Protection coverage in situations of foreseeable risks (mass gatherings, etc).**
- **Coordination and emergency medical care in the event of a disaster or mass casualty incident.**
- **Channeling and organizing citizen volunteer participation in the field of Civil Protection in the face of emergencies, disasters, and catastrophes.**
- **Training for professionals and the general public.**

SYMPTOMS RECOGNITION

Know EMS

Co-funded by the European Union



FIRST RESPONDER TRAINING PROGRAMME

Level of consciusness
Face Arm Speech
Call 112
Request SAMUR-PC

SAMUR-PC EMERGENCY OPERATIONS & DISPATCH CENTRE

Level of consciusness
Face Arm Speech (Cincinnati)
IF STROKE SUSPECTED:
ALS UNIT ACTIVACTION
Medical advice until ALS unit arrives

BASIC LIFE SUPPORT UNIT (BLS)
(x2 EMT)

BLS complete assessment
Madrid Direct Scale
IF STROKE SUSPECTED:
REQUEST SUPPORT
OF ALS UNIT

ADVANCED LIFE SUPPORT UNIT (ALS)
(x1 DOC, x1 RN, x1 EMT)

ALS complete assessment
Madrid Direct Scale
NIHSS
SPECIAL CODE ACTIVATION
DECISION

STROKE CODE

CRITERIA FOR INCLUSION OF AN OUT-OF-HOSPITAL STROKE CODE:

- Stroke with persistent symptoms of less than 24 hours evolution or unknown time of onset.
- Patient's baseline condition: Modified Rankin Scale ≤ 2
- Current neurological deficit present at the time of diagnosis.
- Presence of any of the symptoms of suspected stroke:
  - Sudden numbness, weakness or paralysis of the face, arm or leg of one hemibody.
  - Sudden confusion.
  - Difficulty in speaking or understanding.
  - Sudden loss of vision in one or both eyes.
  - sudden, severe and unexplained headache associated with nausea and vomiting (not attributable to other causes).
  - Difficulty walking, loss of balance or coordination.

EXCLUSION CRITERIA FOR A STROKE CODE:

- Does not meet diagnostic criteria for stroke.
- More than 24 hours of evolution of symptoms.
- Patient with high dependency (Modified Rankin Scale >= 3).
- Clinical situation of irreversible advanced disease.
- Dementia (moderate-severe).

PEDIATRIC OUT-OF-HOSPITAL STROKE CODE

- Patient under 16 years of age.
- Clinical manifestations compatible with stroke: sudden onset of at least one of the following symptoms or signs:
  - Severe headache.
  - Unilateral motor or sensory deficit.
  - Gait disturbance or instability.
  - Altered level of consciousness.
  - Alteration of comprehension or expressive language.
  - Visual disturbance of one or both eyes.
  - First afebrile focal seizure in previously healthy child (with subsequent deficit persisting at the time of assessment).
- Onset of symptoms at consultation less than 24 hours.
- Absence of previous neurological deficit that conditions dependence for activities expected at their age.

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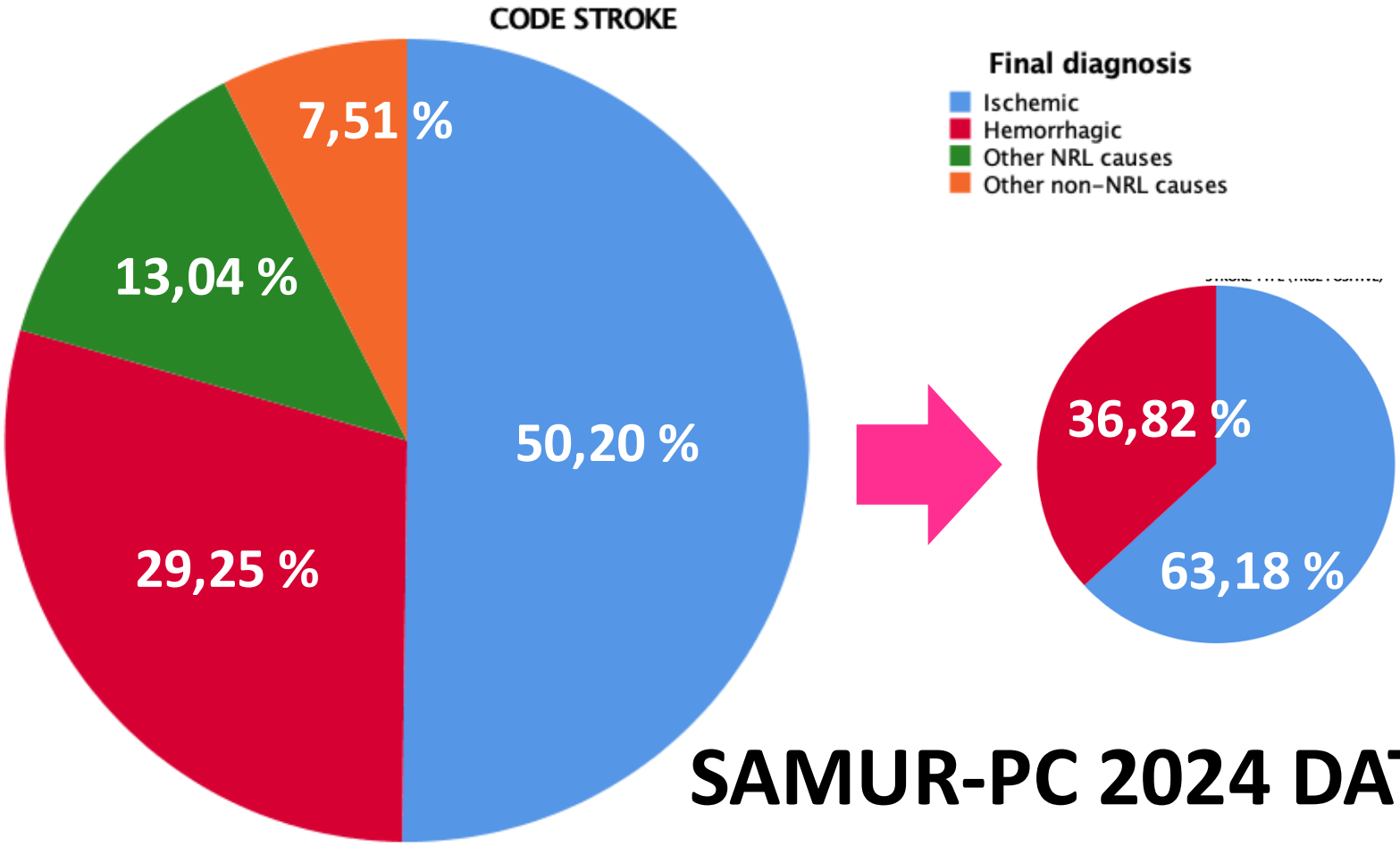


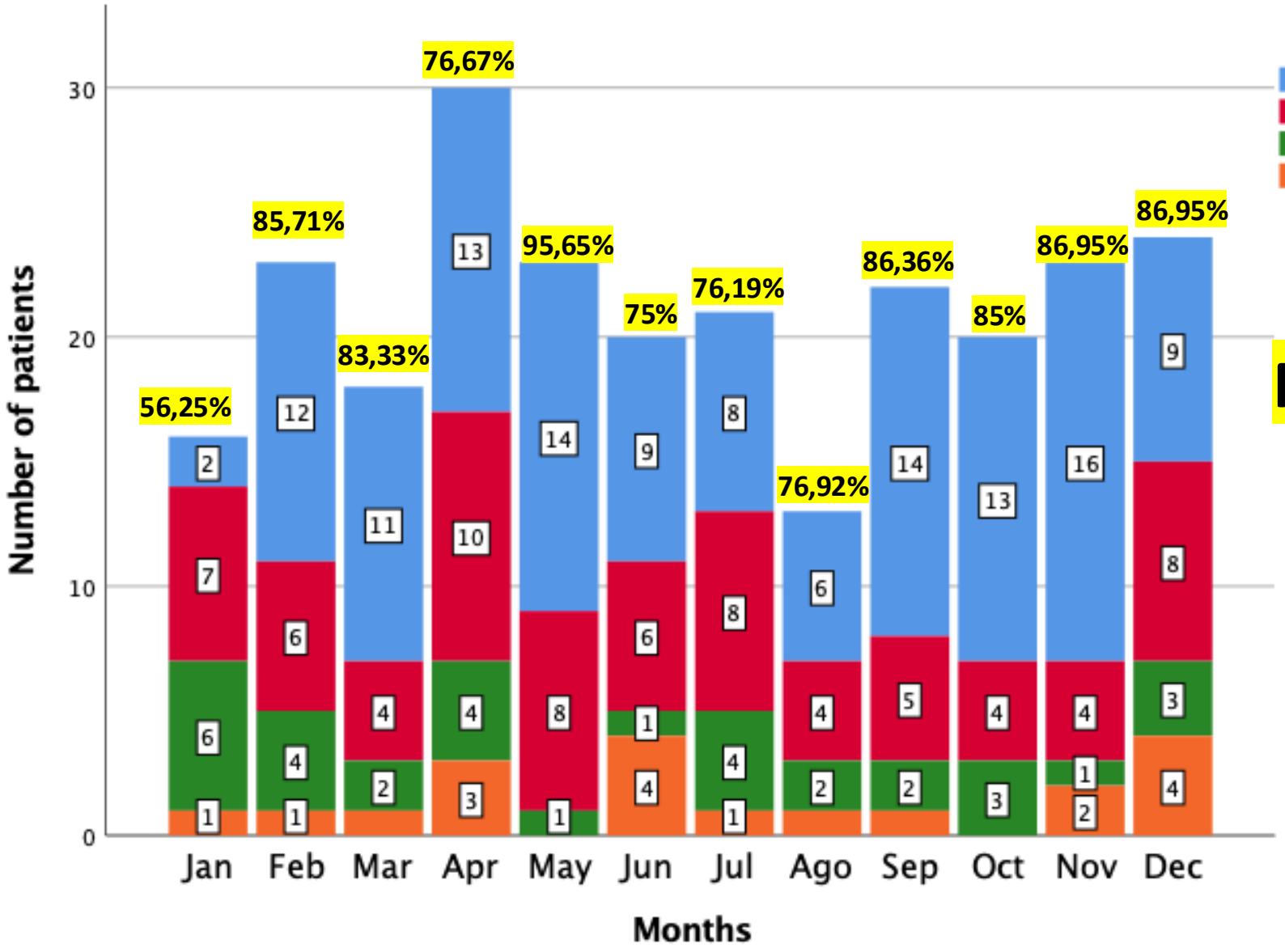
SAMUR-PC 2024 DATA

259 STROKE CODE PATIENTS IN 2024

≈ 80 % CONFIRMED STROKE

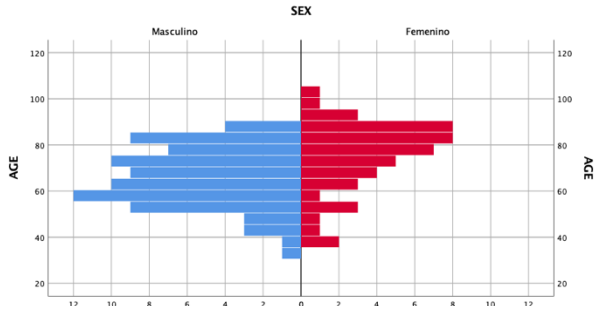
≈ 20% STROKE MIMICS

STROKE MIMICS
Alcohol Intox / **Deprivation**
Cerebral Infections
Drug Overdose/Toxicity
Epidural Hematoma
Hypoglycemia
Metabolic Disorders
Migraines
Neuropathies (Bell's Palsy)
Seizure and Post Seizure
Brain Tumors
Hypertensive Encephalopathy

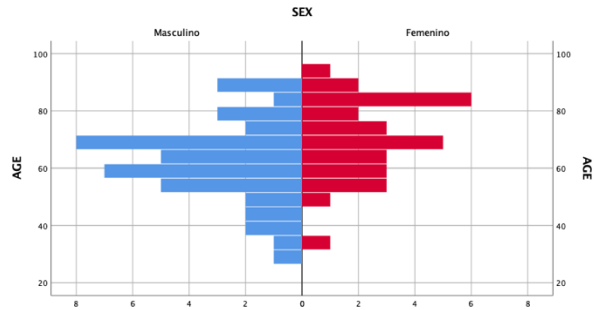


Positive Predictive Value (PPV)
ISCHEMIC + HEMORRHAGIC

Mean: 80,92 % +/- 9,84



ISCH



HEM

MEDICAL STABILIZATION

ALS UNIT + CHIEF MEDICAL OFFICER + CHIEF NURSE OFFICER

- **Oxygen (>92%)**
- **Advanced Airway Management**
- **Analgesia & sedation**
- **Antiemetics**
- **Blood glucose control (<155 mg/dl)**
- **Blood pressure control (<186/106 mmHg)**
- **Temperature control (<37.5°C)**
- **…**

Stay within the safe range!

Keep the patient "NORMO"

Optimal physiological parameters are key for better outcomes.

MEDEVAC

- Stroke team with neurologist available?
- Imaging available?
- Intravenous thrombolysis capable?
- Thrombectomy capable?
- Neurosurgery available?
- Dedicated stroke unit?
- Neurocritical care unit?

“STROKE UNIT”

“STROKE CENTER”

Hospital de la Princesa
Hospital Clínico San Carlos
Hospital La Paz
Hospital Gregorio Marañón
Hospital Ramón y Cajal
Hospital Doce de Octubre

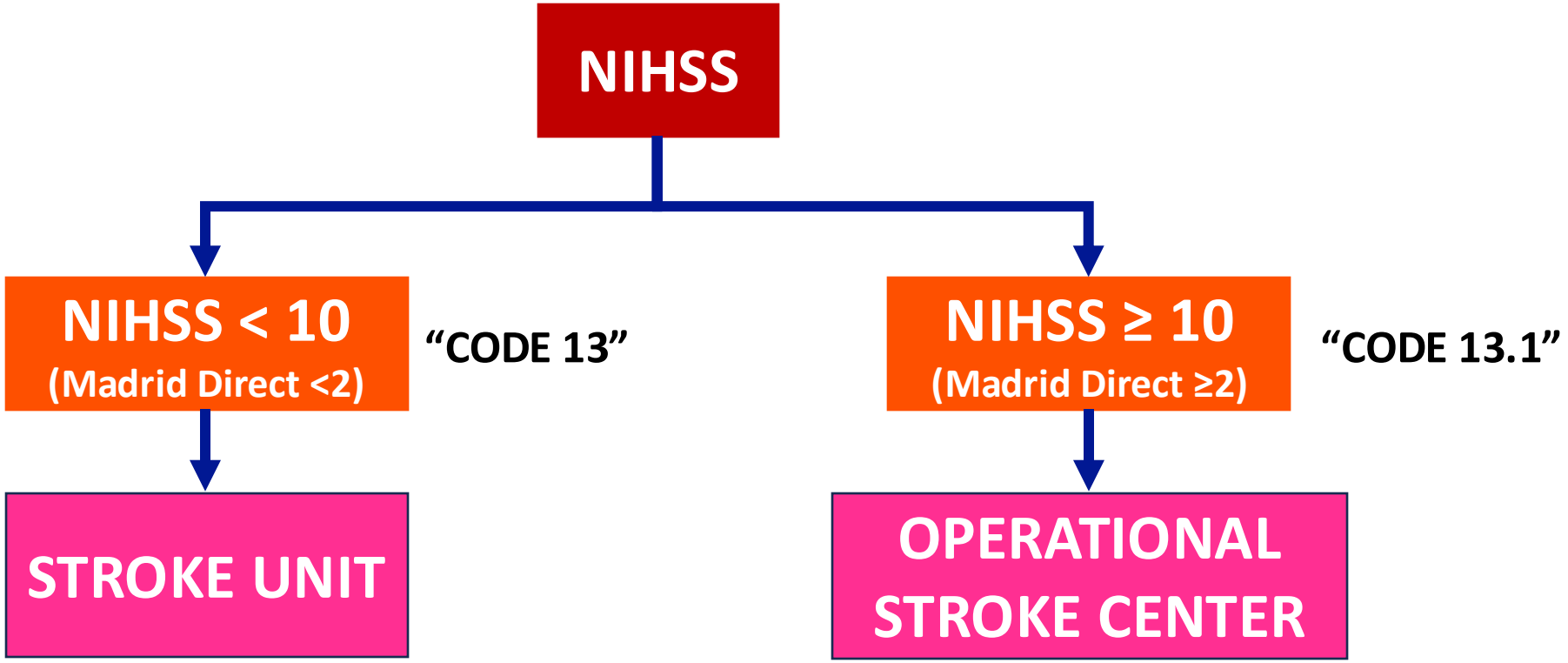
7:30-13:30 working days

ALL HOSPITALS: STROKE UNIT + STROKE CENTER (THROMBECTOMY CAPABLE)

13:30-07:30 working days weekends & holidays

ALL HOSPITALS: STROKE UNIT ONLY THREE HOSPITALS ARE OPERATIONAL AS STROKE CENTER (THROMBECTOMY CAPABLE)

MEDEVAC


NIHSS
NIHSS < 10
(Madrid Direct <2)
"CODE 13"
NIHSS ≥ 10
(Madrid Direct ≥2)
"CODE 13.1"
STROKE UNIT
OPERATIONAL STROKE CENTER

OPERATIONAL TIMES OBJETIVES:

MADRID CODE STROKE OBJETIVES:

SYMTOMS ONSET – DOOR < 2h
CODE STROKE ACTIVATION - DOOR < 1h

OUR DATA

- **ARRIVAL TIME:** 9 minutes 36 seconds +/- 4 minutes 1 second
- **ON SCENE TIME:** 32 minutes 35 seconds +/- 12 minutes 29 seconds
- **TRANSPORT TIME:** 10 minutes 11 seconds +/- 8 minutes 5 seconds
- **TOTAL TIME:** 52 minutes 22 seconds +/- 13 minutes 54 seconds

REFERRAL HOSPITAL HANDOVER

DIRECTLY TO STROKE TEAM (NEUROLOGIST)… BUT WHERE?

Telematic follow up of stroke cases

Joint clinical sessions

Take home messages

- All EMS play a crucial role in the recognition and initial management of stroke. Each region has its own geographic characteristics, and EMS models and available resources vary.
- Time lost is brain lost! It is essential to develop joint strategies and procedures to ensure early symptom recognition, appropriate out-of-hospital care, rapid transport to the most suitable hospital, and seamless continuity of care.
- Advanced Life Support (ALS) units have greater diagnostic and therapeutic capabilities, enabling patient stabilization both on scene and during transport.
- EMS clinical staff must receive continuous training and updates.
- It is necessary to establish and use indicators (KPIs) to assess the quality of care and operational times. If we do not know with precision the current situation, it is impossible to achieve improvement.

SAMUR-PC
DISPATCH CENTRE
STROKE SUSPECTED
SOP

SAMUR-PC
STROKE CLINICAL
SOP

COMUNIDAD DE
MADRID
STROKE CODE
(2021)

SAMUR-PC
STROKE CODE
SOP

SAMUR-PC
PEDIATRIC STROKE
CLINICAL
SOP

"What is not defined cannot be measured.
What is not measured, cannot be improved.
What is not improved, is always degraded"

William Thomson Kelvin

Thank you
Muchas gracias

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