

**STROKE
ACTION
PLAN
EUROPE
2018 – 2030**



SAP-E ESSENTIALS OF STROKE CARE

An overview of evidence-based interventions covering the entire chain of stroke care.

SAP-E Essentials of Stroke Care

This document is aimed at people working with stroke; another document aimed at people working with planning of stroke care or advocacy for stroke care will be published on the SAP-E website in due time.

The Essentials of Stroke Care manifesto was made as a tool for The Stroke Action Plan for Europe (SAP-E) [1] and has been endorsed by the European Stroke Organisation.[2]

Stroke care must be administered over the complete chain of stroke treatment including acute care, secondary prevention, rehabilitation, and life after stroke to respond to all needs of patients – and to avoid that patients are left with unnecessary residual symptoms, cognitive and psychological deficits, and high risk of recurrency. Mortality after stroke depends on quality of stroke unit care [1], and improving standard of stroke unit care reduces both mortality [3] and long term disability [4]. Implementing models that ensure delivery of appropriate care to all patients can further reduce mortality with effects sustained over time [5].

The Essentials of Stroke Care Manifesto sets an essential standard for providing stroke care in the pre-hospital setting, during the acute hospital stay, during rehabilitation and during life after stroke and includes surgical, pharmacological, non-pharmacological, and supportive interventions.

Essential requirements for reasonable stroke care are needed when planning and updating of services, ensuring the needed competences in health care professionals, as well as for ensuring completeness of local hospital protocols, and finally for younger health care staff to be familiar with the minimum standard within the entire chain of stroke care.

We recognise that there may be additional components of excellent stroke care above and beyond the basic interventions listed in this document. While they are clearly important, it was beyond the scope of this work to include them as we refer readers to relevant ESO guidelines.

The Essentials of Stroke Care Manifesto was prepared by a sub-committee established by the ESO Guideline Board at the request of the SAP-E Implementation Steering Committee (members listed at end). The list of interventions covers the patient's pathway through care and are based on best evidence-based guidelines. This document was prepared by a sub-committee established by the ESO Guideline Board at the request of the SAP-E Implementation Steering Committee. The manual contains recommendations from high-quality guidelines. These were translated into a practical list of what to do and what not to do. We used ESO guidelines wherever available. If there were none, we preferred GRADE-based guidelines.[4] If no GRADE-based guideline existed, we chose the best available guideline based on consensus. We referenced to the source and provided information on the type of source (e.g. evidence-based recommendation (EBR), systematic review (SR), meta-analysis (MA), randomized controlled trial (RCT), consensus statement (CS), research article (RA)) to allow the reader judging on the quality of the evidence as well as offering easy access to further reading. Abbreviations are listed at the end of the text (Table 1).

Pre-hospital management

Must do	Source	Type of source
1. Educational campaigns to increase the awareness of immediately calling EMS for people with suspected stroke	[5]	EBR
2. EMS technicians and paramedics should be trained in a simple pre-hospital stroke scale to identify potential stroke patients.	[5]	EBR
3. EMS should implement a 'code-stroke' protocol including highest priority dispatch, pre-hospital notification and rapid transfer to nearest 'stroke ready' hospital	[5]	EBR
Don't do	Source	Type of source
1. Routine use of O ₂ ; only use if SpO ₂ <95%	[5]	EBR
2. Pre-hospital administration of insulin	[5]	EBR
3. Pre-hospital induction of hypothermia	[5]	EBR

On arrival with suspected stroke or TIA

Must do	Source	Type of source
1. Patients should be admitted to a hospital with a defined rapid pathway for acute stroke and staff with expertise in acute stroke	[6]	EBR
2. Patients should have a swift but careful clinical assessment, including neurological examination; use a stroke severity rating, e.g. NIHSS	[6]	EBR
3. Immediate brain imaging with non-contrast CT or MRI (DWI, T2*/SWI, FLAIR) in patients with ongoing symptoms	[7]	EBR
4. CT or MR angiography should be performed in all patients arriving within 6 hours or potentially eligible for thrombectomy.	[8]	EBR
5. In patients arriving with unknown time of onset within 6 – 24 hours and potentially eligible for IVT or EVT, MRI with MRA and MRP or CT with CTA and CTP should be performed.	[9]	EBR
6. Acute blood work-up including - aPTT, INR, electrolytes, creatinine/eGFR, complete blood count, and ECG – but should not delay reperfusion therapy	[10]	EBR
Consider doing	Source	Type of source
1. MRI with DWI, FLAIR, T2*/SWI and TOF +/- CE-MRA of cervical arteries in patients with TIA after specialist assessment	[11]	EBR

Acute reperfusion treatment

Must do	Source	Type of source
1. Blood glucose must be measured before start of IVT	[11]	EBR
2. IVT with alteplase in potentially disabling stroke, also minor, within 4.5 hours of onset, irrespective of age, unless contraindications are present	[9]	
3. Reperfusion therapy (IVT and / or MT based on individual considerations) in basilar large vessel occlusion within 6 hours of onset.	[8,9]	EBR
4. Reperfusion therapy (IVT and/or MT) in selected patients in the late time window with favourable imaging profiles, as detailed in specific guidelines	[8,9]	EBR

Initiate acute pharmacological therapy

Must do	Source	Type of source
1. Aspirin should be given given in ischaemic stroke or TIA on arrival after primary imaging in patients not receiving reperfusion therapy, usually 250-300 mg aspirin	[6]	EBR
2. Blood pressure should be kept <185/110 mmHg in the first 24 hours after IVT and MT by pharmacological and non-pharmacological interventions	[9,12,13]	EBR
3. ICH: In acute ICH, blood pressure should be lowered to a systolic blood pressure at or below 140 mmHg as fast as possible and within 6 hours and blood pressure lowering maintained for up to 7 days.	[13,14]	EBR
4. In seizures within 7 days, give antiepileptic drugs for 3 months	[6]	EBR
5. In seizures occurring after day 7, start long-term antiepileptic drugs	[6]	EBR
6. ICH: in OAC-related ICH consider reversal therapy according to drug	[15]	EBR
Don't do	Source	Type of source
1. Blood pressure lowering in patients with ischaemic stroke and not receiving reperfusion therapy unless blood pressure is very high (>220/120 mmHg) and blood pressure lowering is indicated for other reasons.	[6]	EBR
2. Systolic blood pressure should not be reduced more than 90 mmHg in acute ICH to prevent kidney injury	[13]	EBR
3. Do not use antiepileptic drugs for primary prevention of seizures	[6]	EBR

Acute stroke unit care

Must do	Source	Type of source
1. Admit to stroke unit on arrival to hospital, the stroke unit is suitable for all types of stroke / TIA.	[11]	EBR
2. Swallowing screening must be done on admission and before the patients is given any oral food, fluid, or medication. If swallowing problems are present, specialist (nurse, OT etc.) assessment is indicated preferably within 24 hours to decide if dietary modification or tube feeding is required, and initiate swallowing therapy.	[16]	EBR
3. Help the patient to sit out of bed, stand or walk if the overall clinical condition allows for mobilization within the first 24 hours	[17]	EBR
4. Initial screening and assessment by rehabilitation professionals (physiotherapy, occupational therapy, speech, and language therapist) within 48 hours and using a standardized protocol	[17]	EBR
Don't do	Source	Type of source
1. If help is needed to sit out of bed, stand or walk, do not offer high dose mobilization in the first 24 hours.	[14]	EBR

Stroke unit rehabilitation and care/early supported discharge

Must do	Source	Type of source
1. All people who require inpatient rehabilitation following stroke should be admitted to a specialized stroke unit for rehabilitation and care	[18]	EBR
2. On the stroke unit, there should be a multidisciplinary team consisting of professionals with stroke expertise including physicians, nurses, occupational therapists, physiotherapists, speech-language therapists, social workers, and clinical dietitians	[18]	EBR
3. Basic assessment components should include swallowing, mood and cognition, temperature, nutrition, bowel and bladder function, skin breakdown, mobility, functional assessment, discharge planning, venous thromboembolism prophylaxis	[18]	EBR
4. Involve patients and carers in the rehabilitation process, and provide education and information on stroke	[18]	EBR
5. The rehabilitation team follows best practices as defined by practice guidelines.	[18]	EBR
6. Early supported discharge (ESD) – if available - is beneficial for patients with mild to moderate stroke symptoms, who are medically stable, and have the resources for care and support at home. ESD is best provided by the team that provided the	[18]	EBR

patient's inpatient rehabilitation, and should be initiated within 3 days of discharge.		
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Stroke unit rehabilitation and care/early supported discharge

Don't do	Source	Type of source
1. Don't withhold stroke unit care from patients with uncertain rehabilitation potential.	[19]	EBR

Prevention of complications

Must do	Source	Type of source
1. Use thigh high, sequential intermittent pneumatic compression (IPC) to prevent DVT and PE in immobilized patients for ischemic stroke or intracranial haemorrhage. If IPC is not available, use LMWH in prophylactic doses in patients with ICH waiting at least up until 48 to 72 hours	[20] (ICH)	EBR
2. Assess post-void residual volume by ultrasound and use intermittent catheterization to prevent urinary tract infections	[11]	EBR
3. Prevent delirium by structured observation, non-pharmacological interventions, and medically according to local practice in manifest delirium	[21]	EBR
4. Prevent falls according to usual practice	[22]	EBR
Don't do	Source	Type of source
5. Use of graduated compression stockings	[23]	EBR
6. Use of unfractionated heparin, except in patients with severe renal failure	[23]	EBR
7. Use of indwelling catheters due to risk of urinary tract infections and lower urinary tract syndrome	[11]	EBR

Further work up during stroke unit stay

Must do	Source	Type of source
1. Blood work-up: fasting plasma-glucose or HbA1C, lipid profile, liver status	[11]	EBR
2. Repeated blood pressure measurements, e.g. every 15 to 30 minutes depending on and until good quality of blood pressure control	[11]	EBR
3. Telemetry for 24 hours or more, also depending on clinical needs (blood pressure control, heart rhythm analyses, oxygen saturation)	[11]	EBR

4. Clinical assessment for structural heart disease (history, physical examination, auscultation)	[11]	EBR
5. Carotids for carotid artery stenosis (Doppler or angiography (CT/MRI))	[11]	EBR
6. Additional monitoring in patients with a suspected cardio-embolic mechanism who are potential candidates for OAC	[24]	EBR
Consider doing	Source	Type of source
1. Echocardiography should be used whenever a potential cardiac aetiology is suspected (medical history, embolic imaging (CT, MRI) aspect, ECG, etc.).	[25]	EBR
2. CT angiography for large vessel disease in aortic arch and intracerebral vessels	[11]	EBR

Pharmacological secondary prevention

Must do	Source	Type of source
1. Provide personalized treatment for cardiovascular risk factors which includes both lifestyle and pharmacological approaches.	[26]	EBR
2. Approaches must consider the physical and cognitive disabilities after stroke and a person's capacity to understand and take medication.	[26]	EBR
3. Secondary prevention measures should be commenced as soon as possible and preferably within one week; antithrombotics within 24 hours	[26]	EBR
<i>Antihypertensives</i>		
1. The aim of blood pressure treatment is to achieve a clinic systolic blood pressure of below 130 mmHg on a consistent basis. A higher threshold may be justified in people with bilateral carotid artery disease, in the elderly or in people who are frail and with limited life expectancy.	[27]	EBR
2. Choice of antihypertensive agent will vary according to local practice. Compliance issues, pricing, number of daily doses and side effect profile should be taken into consideration.		GCP
3. Long-term treatment with a statin drug should be offered in people with ischaemic stroke unless contraindicated	[12]	CS
4. In people with ICH, statins can be given if another indication is present but are not routinely needed for ICH	[12]	CS
<i>Antithrombotics</i>		
5. In ischaemic stroke or TIA with no atrial fibrillation, give long-term antiplatelets unless contraindicated	[28]	EBR
6. In ischaemic stroke or TIA with atrial fibrillation, give long-term anticoagulants unless contraindicated. Choice of drug will vary	[28]	EBR

with local practice, but direct oral anticoagulants are safer than vitamin K antagonists.		
Consider doing	Source	Type of source
1. Ischemic stroke: Consider closure of patent foramen ovale in patients up to 60 years and no alternative cause of stroke	[29]	EBR
2. Ischemic stroke: Consider LAAO in atrial fibrillation with contraindications for anticoagulation	[30]	EBR
3. ICH related to oral anticoagulation therapy because of atrial fibrillation: include into a trial or consider restarting long-term oral anticoagulation therapy after individual consideration of risks and benefits	[12]	CS
Don't do	Source	Type of source
1. Do not give antiplatelets in atrial fibrillation unless on another indication	[31]	EBR
2. Do not bridge with heparin before initiating anticoagulants	[31]	EBR

Carotid artery disease

Must do	Source	Type of source
1. Unless frailty or comorbidity would obviously contraindicate interventions, work-up for carotid artery stenosis should be done (Doppler ultrasonography and/or CT-angiography or MRA) preferably within 48 hours of symptom onset if not already done on admission	[32]	EBR
2. People with 70 - 99% symptomatic stenosis should be referred to a vascular surgeon immediately. In people with 50-69% symptomatic stenosis consider carotid endarterectomy.	[33]	EBR
3. CEA or CAS should preferably be performed within 14 days of stroke onset unless contraindicated	[33]	EBR
4. CEA is preferred to CAS in people > 70 years	[33]	EBR

Non-pharmacological secondary prevention – life-style modifications

Must do	Source	Type of source
1. Give advice to stop smoking and offer cessation support which may include pharmacotherapy	[34]	EBR
2. Give advice to limit alcohol intake to 14 units/week in men and 7 units/week in women, offer support	[34]	EBR

3. Give guidance on diet. This will vary according to local practice but may include: a. eat five or more portions of fruit and vegetables per day b. reduce and replace saturated fats in their diet with polyunsaturated or monounsaturated c. reduce salt intake	[34]	EBR
4. Exercise and physical activity should be encouraged considering the individual capabilities	[34]	EBR

After discharge

Must do	Source	Type of source
1. Discharge must be planned involving patient and relatives to ensure needed care is provided and patients and carers informed on what minimum support to expect.	[18]	EBR
2. Blood pressure should be monitored regularly after discharge from hospital	[18]	EBR
3. Follow-up on pharmacological and non-pharmacological secondary prevention is planned, including use of a post-stroke check-list	[35,36]	RA

Life after Stroke

Aspect	Must do	Source	Type of source
Follow-up	Patients should be followed up after stroke at least annually for functional decline and new symptoms including pain, e.g. by use of the post-stroke check list, [37] and referred if relevant	[38]	EBR
Involvement, support and education of patients and relatives	Patients and relatives should be involved in making care plans and other planning or decisions for life after stroke and receive appropriate support and education	[38]	EBR
Driving	Assessment for driving ability should be performed according to local legislation	[38]	EBR
Participation (social, work, leisure-time activities)	Individual assessment should be performed, and referral and counseling provided when relevant	[38]	EBR
Relationships/sexuality	Education and counselling should be provided	[38]	EBR
Disability support	Care plans should be completed, and applications made in a timely manner	[38]	EBR

Advanced care planning	Advanced care planning should be made and periodically reviewed.	[38]	EBR
Transition to long-term care	Discharge summary and care plan should be present on admission to long term care In case of ongoing rehabilitation goals, there should be access to relevant rehabilitation services In case of changes in status, there should be access to re-evaluation and rehabilitation	[38]	EBR

This document was developed by the below listed writing group set up by the SAP-E Implementation Steering committee approved by this committee and endorsed by the ESO Executive committee.

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Table 1: Abbreviation

	Action Plan
AIS	Acute ischemic stroke
CAS	Carotid artery stenting
CEA	Carotid endarterectomy
CEMRA	Contrast enhanced MRI
CT	Cerebral computed tomography
CTA	Cerebral computed tomography angiography
DWI	Diffusion weighted imaging (MRI sequence)
ECG	Electrocardiography
EBR	Evidence based recommendation
EMS	Emergency medical system
ESO	European Stroke Organisation
ESD	Early supported discharge
FLAIR	Fluid-attenuated inversion recovery (MRI sequence)
GRADE	Grading of Recommendations Assessment Development and Evaluation

HbA1c	Hemoglobin A1c
ICH	Intracerebral hemorrhage
IPC	Intermittent pneumatic device
IVT	Intravenous thrombolysis
LAAO	Left atrial appendage occluder
LMWH	Low molecular weight heparin
LVO	Large vessel occlusion
mmHg	Millimeter Mercury
MA	Meta-analysis
MRA	MRI angiography
MRI	Magnetic resonance imaging (here: of the brain)
MT	Mechanical thrombectomy
NASCET	North American Symptomatic Carotid Endarterectomy Trial
OAC	Oral anticoagulant
OT	Occupational therapy
PFO	Patent foramen ovale
PT	Physiotherapy
PTT = aPTT	Partial thromboplastin time = activated PTT
RCT	Randomized Controlled Trial
SaO ₂	Oxygen saturation
SWI	Susceptibility weighted imaging (MRI sequence)
SR	Systematic review
T2	Transverse relaxation time (MRI sequence)
TIA	Transitory ischemic attack
TOF	Time of flight (MRI sequence)

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