

Long-term secondary stroke prevention

Simona Sacco

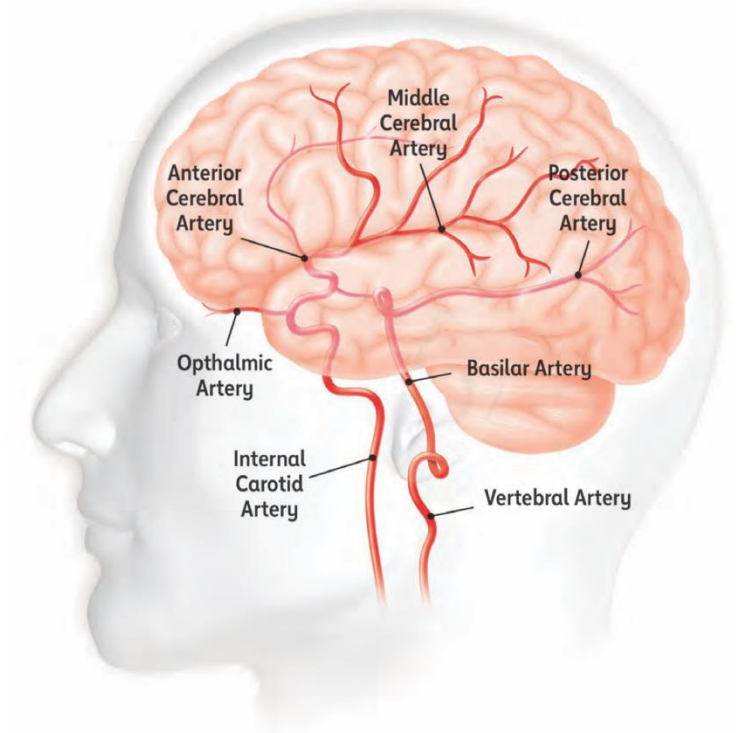
Full Professor of Neurology – University of L'Aquila, Italy

President European Stroke Organisation

WHAT IS SECONDARY PREVENTION?

Secondary stroke prevention is the prevention of stroke in people who already had a stroke or a transient ischaemic attack

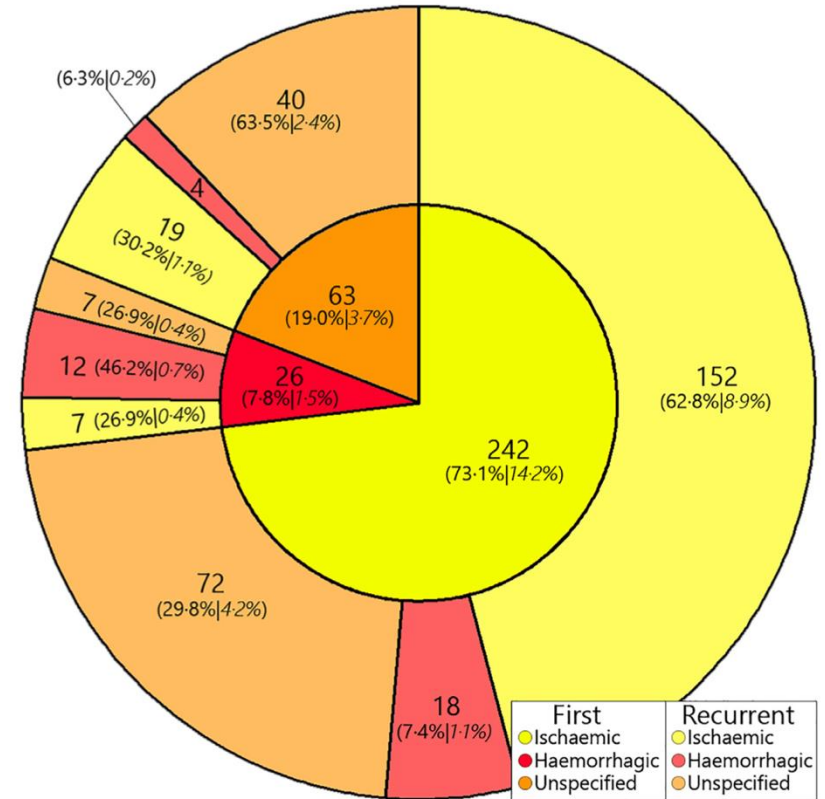
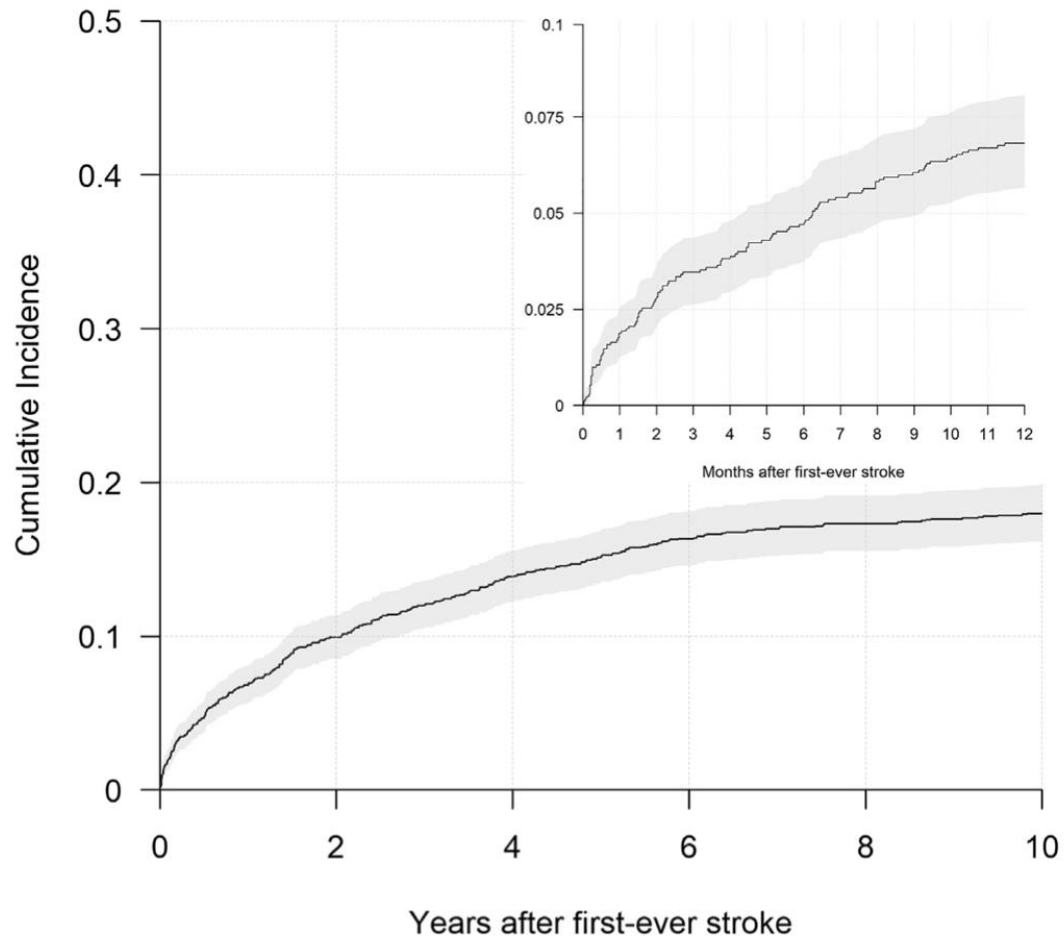
- Recurrent events contribute substantially to the overall burden of cerebrovascular disease - about **20-30% of strokes occur in people who previously had a stroke or a TIA**
- Recurrent strokes tend to be **more disabling** and to have **poorer outcomes**



WHY IS SECONDARY PREVENTION IMPORTANT?

- **45–80% of recurrent strokes and TIA could be prevented**
- Secondary prevention can also reduce cognitive decline, mood disturbances, fatigue, and poor quality of life, as well as other vascular events, and the associated functional impairment and mortality

RISK OF STROKE RECURRENCES



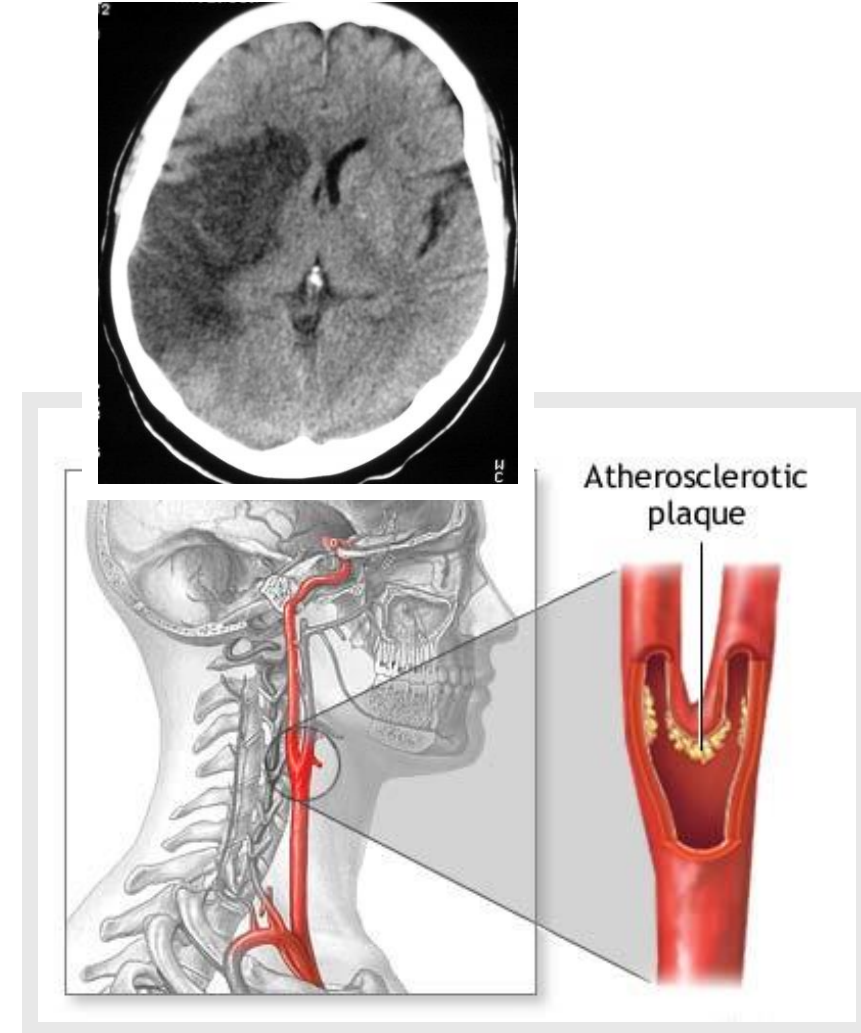
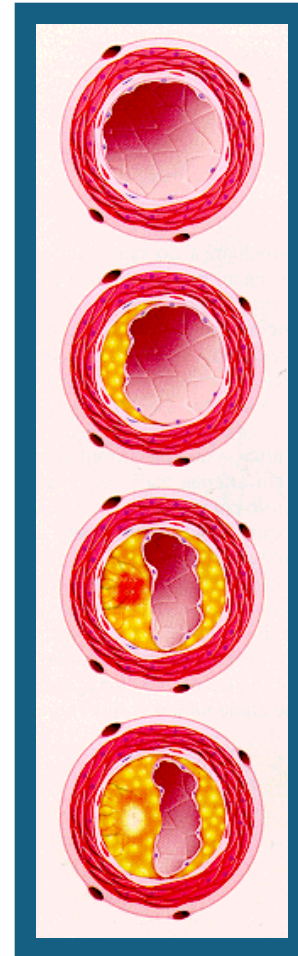
Inner circle is the first events;
outer circle is recurrent events

BASICS FOR SECONDARY PREVENTION

- Each stroke is different and its causes need to be worked out in order to plan better secondary prevention methods
- Identify stroke etiology
- Manage future stroke risk with drugs and lifestyle changes

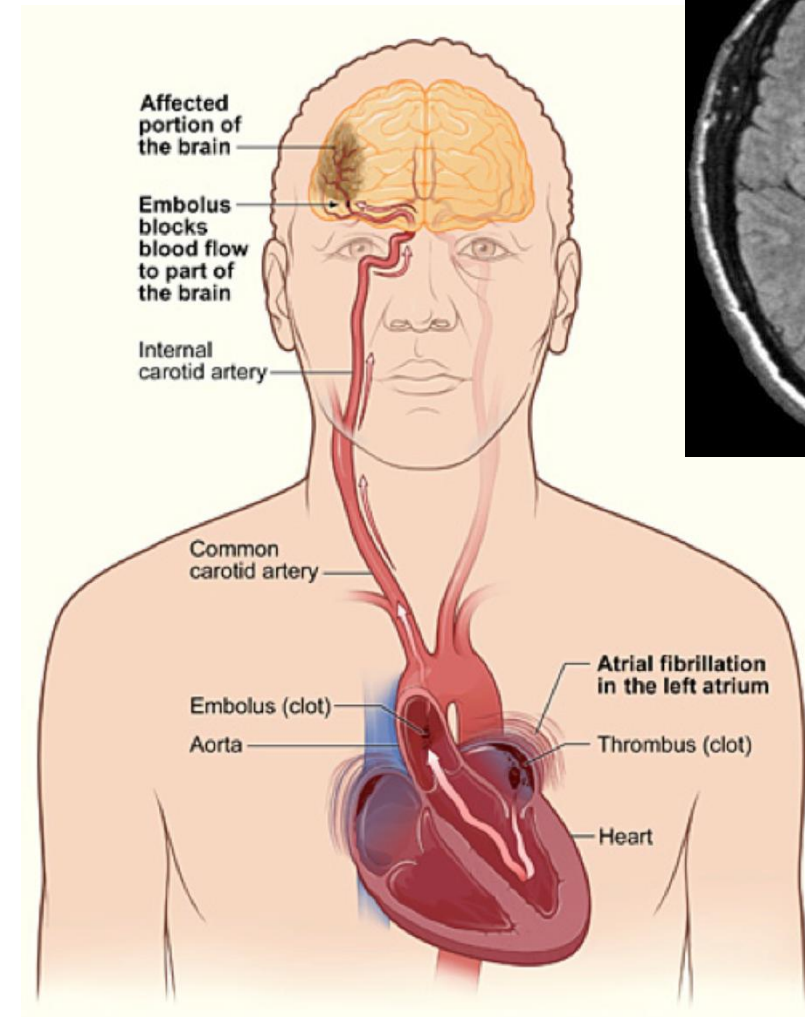
THREE MAIN MECHANISMS OF ISCHEMIC STROKE

- Large artery atherosclerosis
- Cardiembolism
- Small-artery disease



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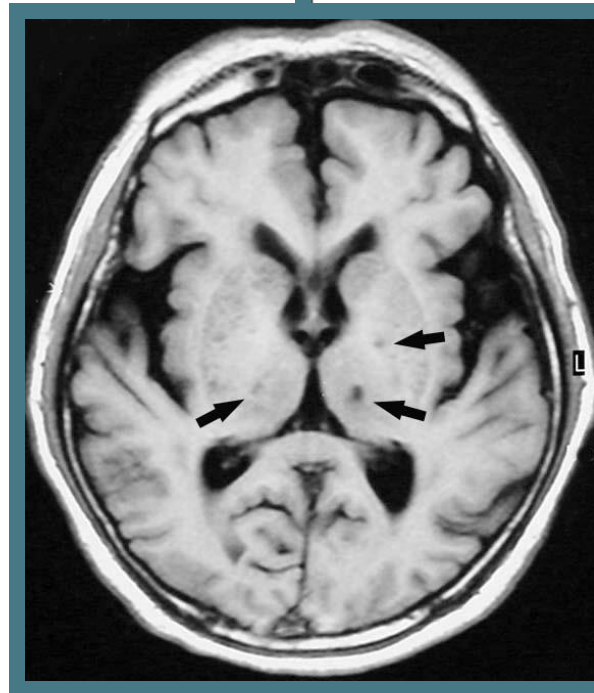
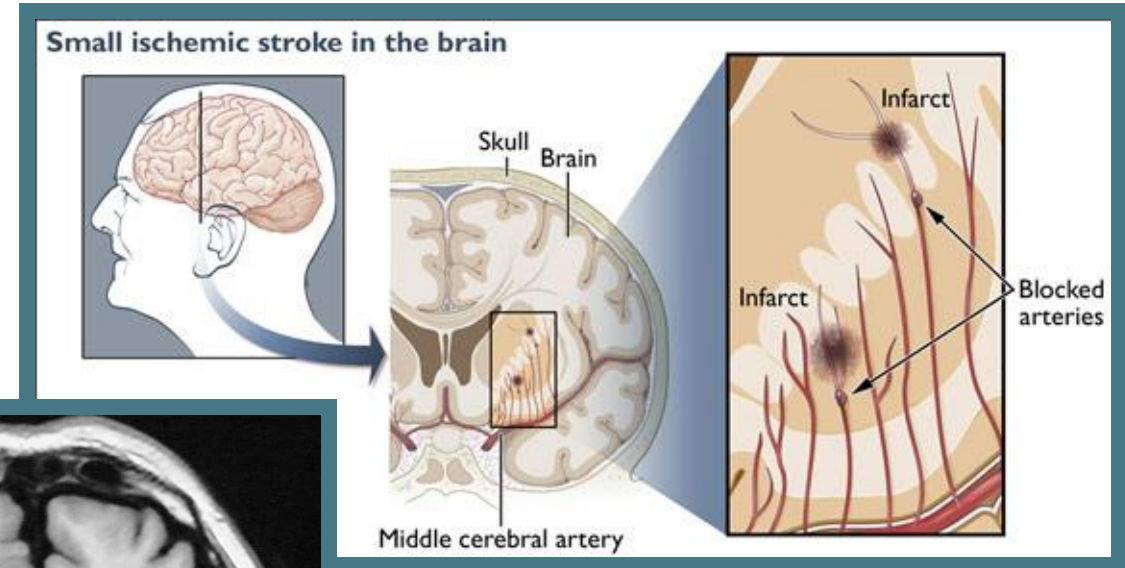


THREE MAIN MECHANISMS OF ISCHEMIC STROKE

➤ Large artery atherosclerosis

➤ Cardiembolism

➤ Small-artery disease



MEDICAL MANAGEMENT FOR SECONDARY STROKE PREVENTION

Antithrombotics: for almost all patients with ischemic stroke

Lipid-lowering drugs: to reach the target goal of LDL-cholesterol (goal LDL-C <70 mg/dL or 50 mg/dL)

Antihypertensives: for patients who have have an average office BP of $\geq 130/80$ mm Hg

Andiabetics: in patients with high glucose levels

Surgery: for selected patients with carotid stenosis

Other measures: highly selected patients

ANTITHROMBOTICS IN STROKE

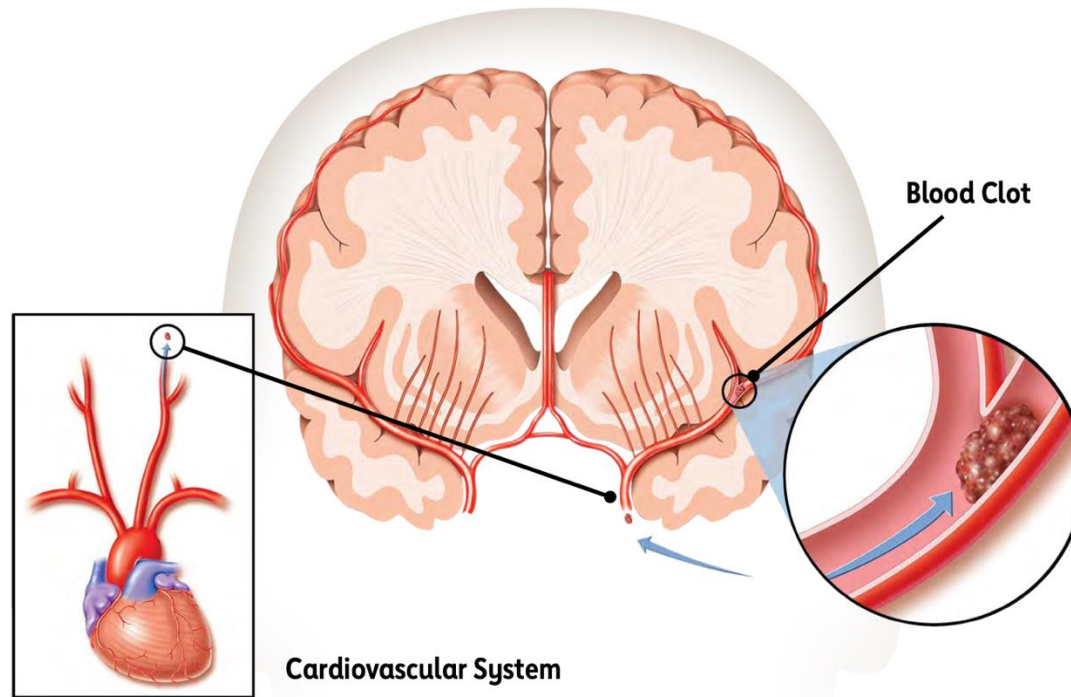
Antiplatelets for non-cardioembolic stroke:

Acetylsalicylic acid

Clopidogrel

Start asap

Dual antiplatelets for selected patients (for around 21 days)



Anticoagulants for cardioembolic stroke:

Direct anticoagulants (apixaban, rivaroxaban, dabigatran, edoxaban): no monitoring

Vitamin-K antagonists: blood test monitoring

FUTURE PERSPECTIVES IN SECONDARY STROKE PREVENTION WITH ANTITHROMBOTICS

Factor Xla inhibitors

Ongoing randomized clinical trials:

- OCEANIC-STROKE (asundexian)
- LIBREXIA (milvexian)

Factor Xla inhibitors in the secondary prevention of non cardioembolic ischemic stroke or TIA



OTHER LESS COMMON MECHANISMS OF IS

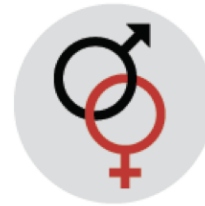
- Arterial dissection
- Patent foramen ovale
- Cancer
- Genetic diseases
- Other

RISK FACTORS THAT CANNOT BE CONTROLLED – BUT TO BE CONSIDERED TO ESTABLISH FUTURE RISK



Age:

While strokes can occur at any age, risk increases after age 55.



Gender:

Women have a lower risk than men before menopause, but more women than men die of stroke.



Family history:

Strokes appear to have a genetic link. You face a higher risk if an immediate family member has had a stroke.



Prior stroke or transient ischemic attack (TIA)

- A person who's had TIA has a one in three more likelihood of having a stroke than someone of the same age and sex who hasn't.
- If you had a stroke, it means you are at a greater risk for another stroke. Almost 1 in 4 will experience a recurrent stroke in the next 5 years.



Race and Ethnicity:

Black people have a higher prevalence of stroke and a higher death rate from stroke than any other racial group.

LIFE-STYLE CHANGES TO CONTROL STROKE RISK



Quit Tobacco Use and Vaping:

Current smokers have a 2 to 4 times increased risk of stroke compared with nonsmokers or those who have quit smoking more than 10 years ago.



Eliminate or Reduce Alcohol Use:

Heavy drinking can increase your risk for stroke. Recommendation is no more than two drinks per day for men and no more than one drink per day for non-pregnant women. Pregnant people should not drink alcohol.



Maintain a Healthy Weight:

Obesity and excessive weight can put a strain on the entire circulatory system.



Increased Physical Activity:

Physical activity can help reduce stroke risk. A brisk 30 minute walk each day can improve daily health (that's just 15 minutes each way!). Aim for at least 150 minutes of moderate to vigorous-intensity physical activity per week.



Eat a Healthy Diet:

- Rich in fresh fruit, vegetables and whole grains
- Include a variety of proteins (lean meats, fish, beans, tofu)
- Minimally processed foods
- Limit salt intake
- Limit intake of added sugars
- Avoid fried foods

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Risk of stroke with different levels of leisure-time physical activity: a systematic review and meta-analysis of prospective cohort studies

Overview of attention for article published in Journal of neurology, neurosurgery and psychiatry, March 2024



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CEREBROVASCULAR DISEASES

All Levels of Physical Activity Can Mitigate Stroke Risk in Adults

Jennifer Leavitt, MS |

April 8, 2024

PERSONALISED DISCHARGE PLANNING IS ESSENTIAL

- Must **involve the stroke survivor and their relatives or carers**
- Should consider the **stroke survivor's physical and cognitive disabilities**, and their ability to understand and take medication
- Should consider the support from **family and other caregivers**
- Should make sure, through liaison with **local service providers**, that the required care will be provided, and that the stroke survivor knows what to expect

PATTERN OF DRUG PRESCRIPTION AFTER STROKE

Data from 17,980 registry patients with stroke/TIA

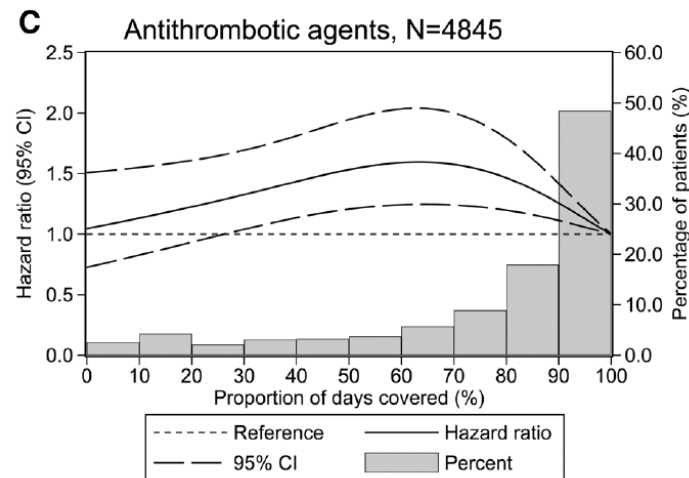
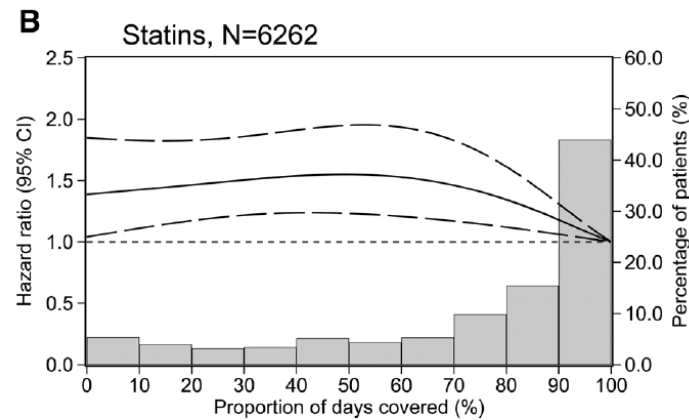
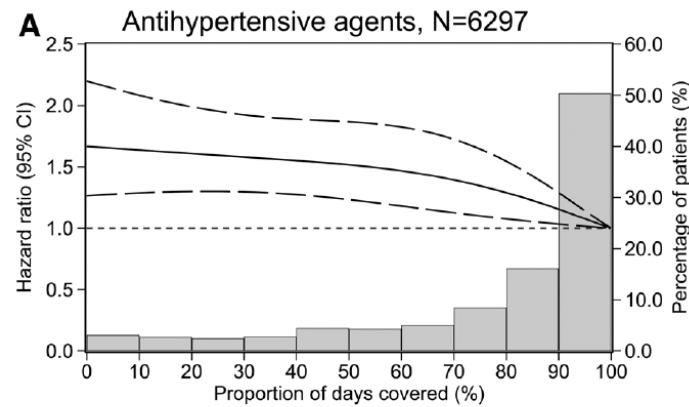
Treatment at discharge:

- 79.3% antihypertensive
- 81.8% antithrombotic
- 82.7% lipid-lowering medication

Discontinuation at 1-year:

- 20.9% antihypertensive
- 34.1% antithrombotic
- 28.5% lipid-lowering medication

ADHERENCE TO SECONDARY PREVENTIVE STRATEGIES AFTER STROKE AND SURVIVAL



Risk of 2-year all cause mortality

	N	All-cause mortality	Goodness-of-fit statistics	
		Adjusted HR (95% CI)*	C statistic (95% CI)	Hosmer and Lemeshow test, † P value
PDC 1%–100%, per 10% increase				
Antihypertensive agents	6081	0.94 (0.92–0.97)	0.754 (0.736–0.772)	0.48
Statins	6062	0.96 (0.93–0.98)	0.747 (0.727–0.767)	0.11
Nonaspirin antithrombotic agents	4691	0.97 (0.94–1.01)	0.761 (0.742–0.779)	<0.001
PDC 61%–100%, per 10% increase				
Antihypertensive agents	4866	0.87 (0.81–0.95)	0.754 (0.734–0.774)	0.42
Statins	4517	0.87 (0.80–0.95)	0.749 (0.727–0.771)	0.21
Nonaspirin antithrombotic agents	3786	0.85 (0.79–0.93)	0.748 (0.727–0.770)	0.36

Usually 80% adherence is considered the target for secondary prevention

Results: additional benefits associated with higher adherence above 60% threshold

PRAGMATIC SOLUTION TO IMPROVE LONG-TERM SECONDARY PREVENTION

- Understand and tackle barriers to effective secondary prevention
- Stroke prevention clinics staffed with health-care professionals with expertise in stroke care, risk reduction programmes, and educational tools.
- Scalable public health intervention to strengthen control
- Embrace digital technology

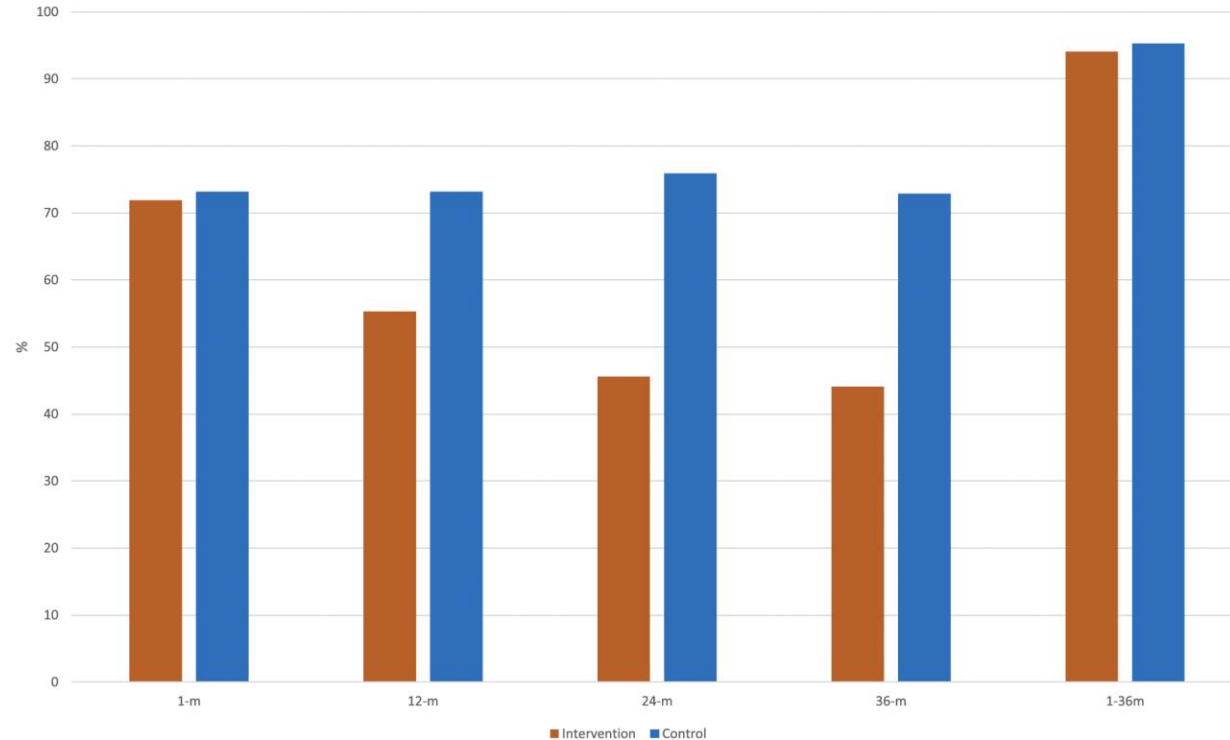
BARRIERS AND FACILITATORS TO ADHERENCE TO SECONDARY STROKE PREVENTION MEDICATIONS AFTER STROKE

Results of a survey (2004-2011) on stroke survivors and their caregivers

- Lack of perceived benefits from medications
 - Question effectiveness
- Question safety of medications
 - Effect of bad press or social media
- Questioning prescription practices
 - Being disappointed that ineffective medications are not changed
 - Having concerns about incorrect medication prescribed
- Management of side effects of pragmatic problems
 - Swallowing problems

LONG-TERM, TELEPHONE-BASED FOLLOW-UP AFTER STROKE AND TIA IMPROVES RISK FACTORS

Proportion of participants with at least one SBP, DBP, or LDL-C measurement above the treatment target

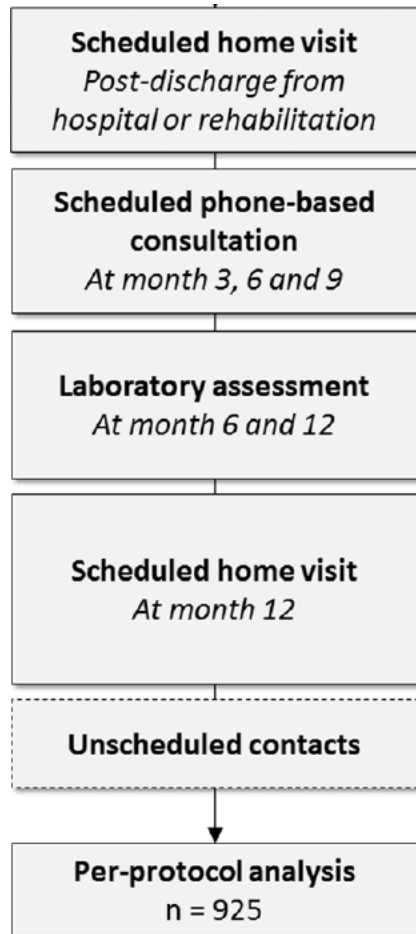


Participants were randomized to either nurse-led, telephone-based follow-up (intervention) or usual care (control).

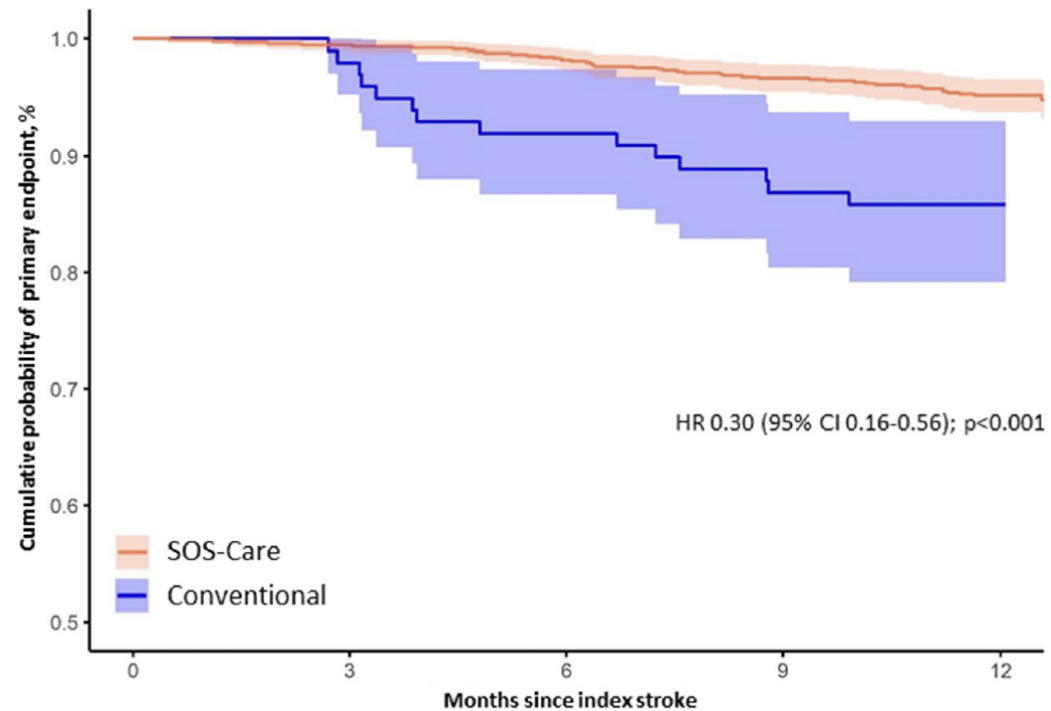
871 randomized patients, 660 completed the 36-month follow-up

Compared with usual care, a **nurse-led telephone-based intervention** that included medication titration after stroke or TIA improved BP and LDL-C levels and increased the proportion of patients that reached the treatment target 36 months after discharge

CASE MANAGEMENT-BASED POST-STROKE CARE FOR PATIENTS WITH ACUTE STROKE AND TIA (SOS-CARE)

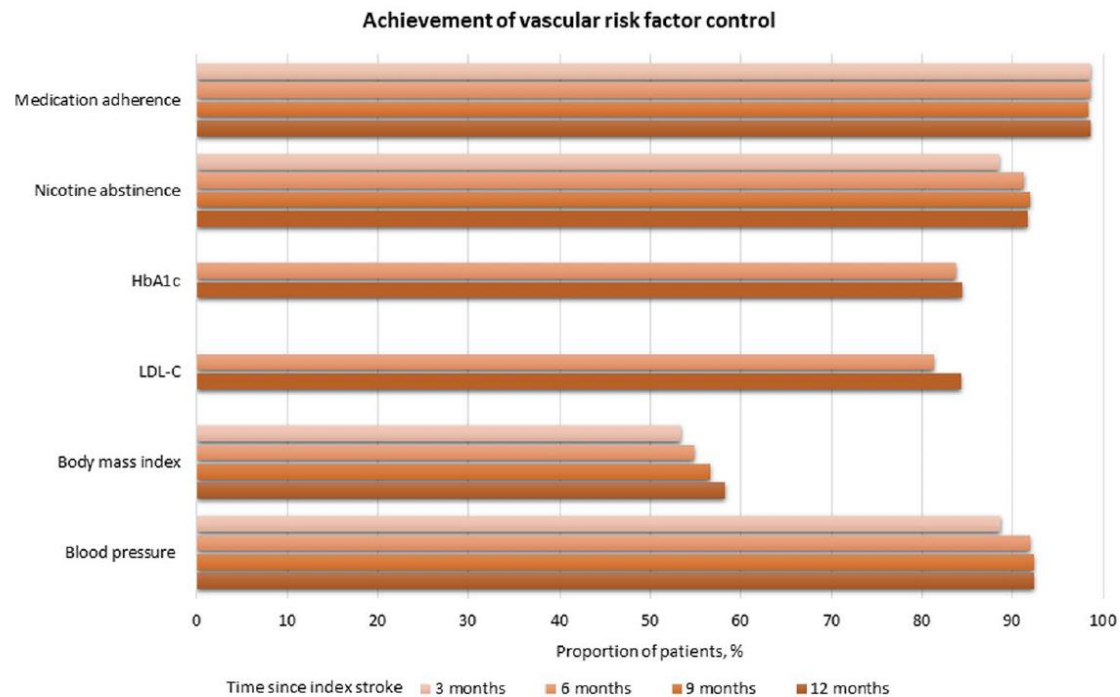


Risk of primary outcome: composite of stroke, TIA, vascular death



CASE MANAGEMENT-BASED POST-STROKE CARE FOR PATIENTS WITH ACUTE STROKE AND TIA (SOS-CARE)

Control of risk factors in the intervention group



Treatment target	n (%)	p
Medication adherence		0.9
3 months	854 (98.6)	
6 months	854 (98.6)	
9 months	851 (98.3)	
12 months	854 (98.6)	
Nicotine abstinence		<0.001
3 months	668 (88.5)	
6 months	689 (91.3)*	
9 months	694 (91.9)*	
12 months	692 (91.7)*	
HbA1c		0.7
6 months	378 (83.8)	
12 months	381 (84.5)	
LDL-C		0.1
6 months	377 (81.3)	
12 months	391 (84.3)	
Body mass index		<0.001
3 months	404 (53.4)	
6 months	412 (54.8)	
9 months	428 (56.6)*	
12 months	440 (58.2)**	
Blood pressure		<0.01
3 months	725 (88.7)	
6 months	751 (91.9)*	
9 months	755 (92.4)*	
12 months	755 (92.4)*	

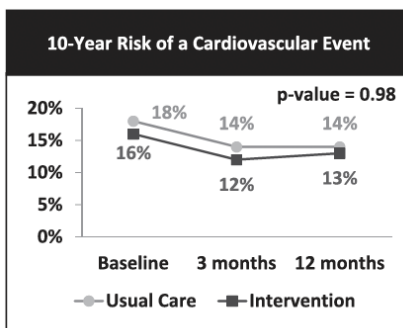
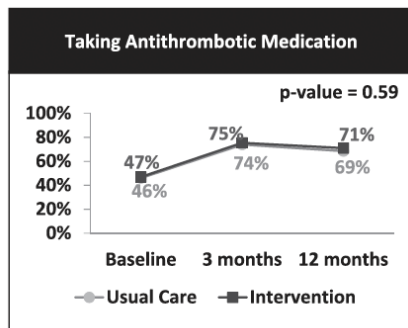
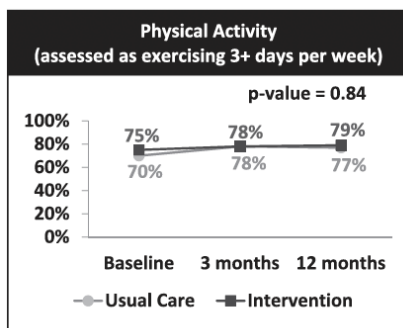
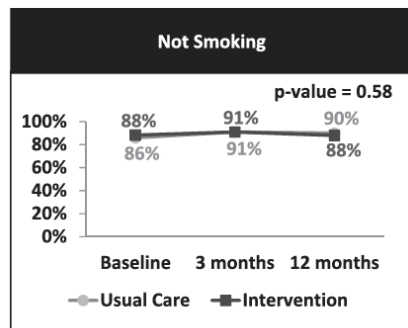
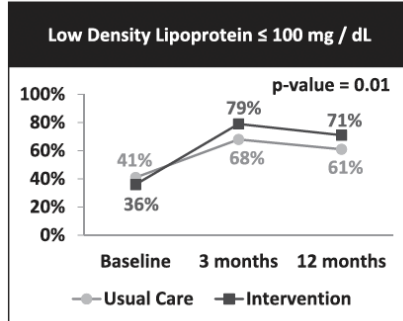
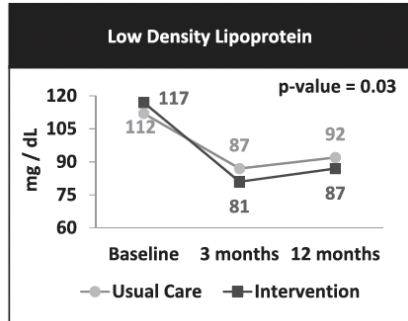
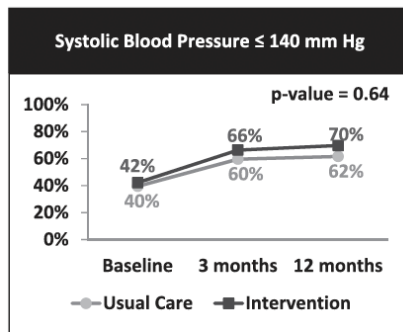
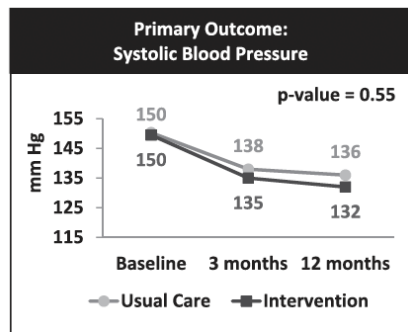
RANDOMIZED CONTROLLED TRIAL OF CHRONIC CARE-BASED INTERVENTION TO IMPROVE SECONDARY STROKE PREVENTION (SUCCEED TRIAL)

Chronic care model-based intervention compared to usual care

1476 people approached; 622 eligible; 407 enrolled in the study

Intervention: nurse practitioner/physician assistant care manager, group clinics, self-management support, report cards, decision support, and ongoing care coordination

Results: intervention did not improve stroke risk factor control beyond what was attained in usual care among vulnerable stroke survivors



Know Your Numbers to Prevent Heart Disease and Stroke

- ♥ My blood pressure ideally should be 120/80 mm Hg or less. Lifestyle changes should start if my blood pressure is above this number. In general, my blood pressure should also be treated with medications when it is more than 130/80 and I have other risk factors or a lifetime risk of cardiovascular disease greater than 10 percent. Otherwise, it is acceptable to start medical treatment when blood pressure is greater than or equal to 140/90. Find a heart attack risk assessment on heart.arizona.edu/heart-health.
- ♥ My tobacco use should be zero.
- ♥ My total cholesterol should be less than 200 mg/dL. My LDL (bad) cholesterol should be less than 100 mg/dL (and perhaps less than 70 mg/dL) if I have cardiovascular disease or am at high risk. My HDL (good) cholesterol should be at least 40 mg/dL, if male, and at least 50 mg/dL, if female.
- ♥ My fasting triglyceride (TG) should be less than 150 mg/dL.
- ♥ My meals should include more than 50 percent vegetables. My daily water intake should be at least 2 liters. My daily salt intake should be less than 1500 mg. My balanced meals should be low fat, low cholesterol and include multi-grain, fresh fruit, and lean meats such as fish. Preparing my own meals will help me maintain a health meal plan. Visit heart.arizona.edu/one-page-diet to help you get started.
- ♥ My exercise ideally should include 150 minutes per week moderate (10,000 steps a day, difficult to talk while exercising); or more than 75 minutes per week high intensity (swimming, running, biking, tennis, basketball).

My Numbers

Date	Blood Pressure	Smoking	Total Cholesterol	Exercise	Diet	BMI	Glucose
	/						
	/						
	/						
	/						
	/						
	/						
	/						
	/						

RISK FACTOR	HIGH RISK	CAUTION	LOW RISK
Blood Pressure	<input type="checkbox"/> >140/90 or unknown	<input type="checkbox"/> 120-139/80-89	<input type="checkbox"/> <120/80
Atrial Fibrillation	<input type="checkbox"/> Irregular heartbeat	<input type="checkbox"/> I don't know	<input type="checkbox"/> Regular heartbeat
Smoking	<input type="checkbox"/> Smoker	<input type="checkbox"/> Trying to quit	<input type="checkbox"/> Nonsmoker
Cholesterol	<input type="checkbox"/> >240 or unknown	<input type="checkbox"/> 200-239	<input type="checkbox"/> <200
Diabetes	<input type="checkbox"/> Yes	<input type="checkbox"/> Borderline	<input type="checkbox"/> No
Exercise	<input type="checkbox"/> Couch potato	<input type="checkbox"/> Some exercise	<input type="checkbox"/> Regular exercise
Diet	<input type="checkbox"/> Overweight	<input type="checkbox"/> Slightly Overweight	<input type="checkbox"/> Healthy weight
Stroke in Family	<input type="checkbox"/> Yes	<input type="checkbox"/> Not sure	<input type="checkbox"/> No
TOTAL SCORE	<input type="checkbox"/> High Risk	<input type="checkbox"/> Caution	<input type="checkbox"/> Low Risk



High Risk > 3: Ask about stroke prevention right away.



Caution 4-6: A good start. Work on reducing risk.



Low Risk 6-8: Good job! Stroke risk is well controlled.



Stroke Riskometer™

Stroke Riskometer™ is a unique and easy to use tool for assessing your individual risk of a stroke in the next five or ten years and what you can do to reduce the risk.

The app can also give you an indication of your risk of heart attack, dementia, and diabetes.

[Learn more here](#)

Assess your personal risk of stroke in a few minutes

Using 20 scientifically tested questions anyone between the ages of 20 to 90+ can quickly see their risk of stroke, as well as getting essential information on how they can reduce their chance of stroke by using the Pro version of the app.

Video: [About the Stroke Riskometer App](#)

Video: [How to enter information in the Stroke Riskometer App](#)

Video: [Managing your risks with the Stroke Riskometer App](#)

Video: [FAST – signs and symptoms of stroke](#)

Video: [Tracking your progress over time using the Stroke Riskometer app](#)

Assess

What is your weight and height?

Weight kg I don't know kg lbs

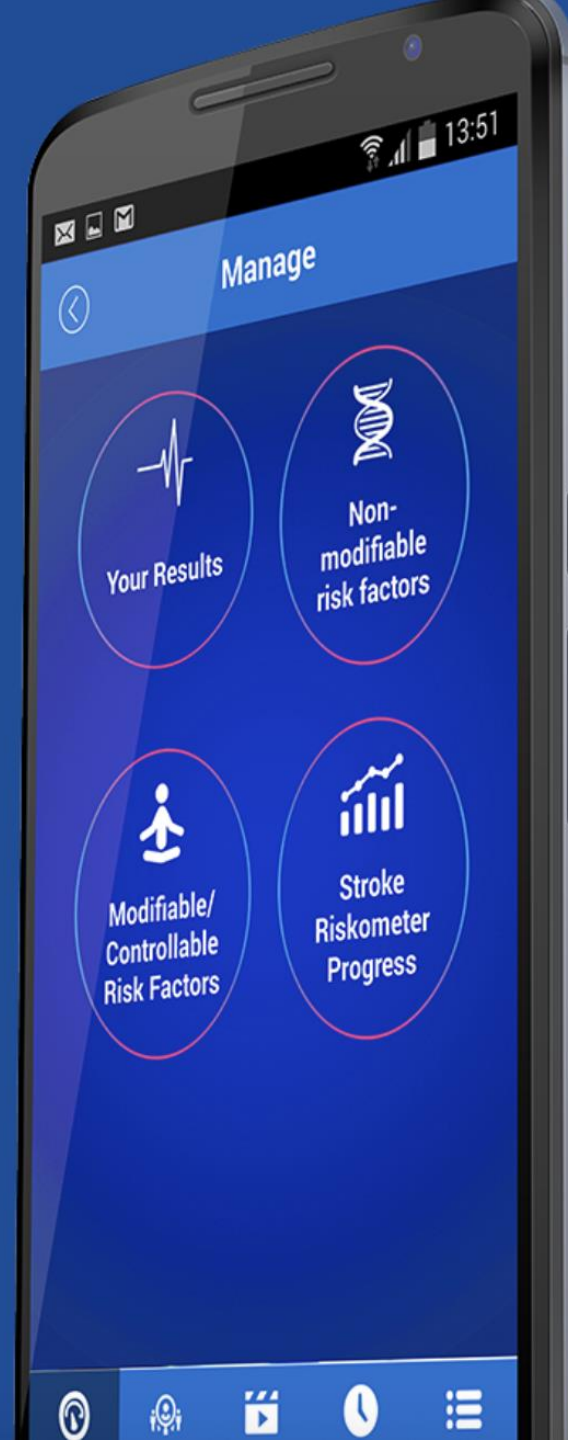
Height cm I don't know cm in

BMI: 27.68

5 Years Risk: 28.56%

Next

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The Stroke Action Plan for Europe (SAP-E) is a pan-European initiative that was outlined by the European Stroke Organisation (ESO) and the Stroke Alliance for Europe (SAFE).

It is the largest stroke project ever undertaken in Europe and sets targets to improve stroke care across the continent run until 2030.

A dark blue rectangular graphic with a yellow and red border. The text 'STROKE ACTION PLAN EUROPE 2018 – 2030' is written in white, bold, sans-serif font, centered within the rectangle.

**STROKE
ACTION
PLAN
EUROPE
2018 – 2030**

SAP-E TARGETS FOR 2030

- Including secondary prevention in national stroke plans with follow-up in primary/community care
- Ensuring that at least 90% of the stroke population is seen by a stroke specialist and have access to secondary prevention management (investigation and treatment)
- Ensure access to key investigational modalities: CT (or MR) scanning, carotid ultrasound, ECG, 24-h ECG, echocardiography (transthoracic and transoesophageal), blood tests (lipids, glucose, HbA1c, coagulation, erythrocyte sedimentation rate, C-reactive protein and autoantibodies)
- Ensuring access to key preventative strategies: lifestyle advice, antihypertensives, lipid-lowering agents, antiplatelets, anticoagulants, oral hypoglycaemic agents and insulin, carotid endarterectomy and PFO closure

IMPORTANCE OF ADVOCACY FOR HAVING POLICIES SUPPORTING STROKE PREVENTION

Promote healthy lifestyle

Access to drugs

Monitoring RF controls



SYNERGY WITH PRIMARY PREVENTION MEASURES AND WITH CV

The Italian health data system is broken

[The Lancet Regional Health – Europe](#)

[Article Info](#) ✓ [Linked Articles \(6\)](#) ✓



STROKE SURVEILLANCE SYSTEMS

Governments need to establish nationwide systems for monitoring the burden of stroke, through registries, electronic health records, and vital statistics systems

Surveillance systems should assess the incidence, prevalence, management, and control of cardiovascular risk factors at the population level

Every country should have electronic health-information systems, with interoperability between systems