CVD: Secondary prevention of Stroke
(DCP4 ID: CVD03-02)
Cluster: Cardiovascular & related disorders

FairChoices
DCP Analytic Tool

Secondary prevention of stroke

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Description of condition and intervention

The secondary prevention concerns about the treatment of individuals who had already stroke or transient ischemic attack (TIA). The leading cause of stoke is hypertension. The common symptom of this cause is unexpected onset of weakness, confusion, loss of balance, severe headache, and complexity of seeing things. Reducing blood pressure, controlling diabetes, stop smoking, and improving lifestyle are the most cost-effective methods to prevent this health problem. Long term management of ischemic heart disease, stroke, and peripheral vascular disease with aspirin, beta blockers, ACEi, and statins (as indicated) to reduce the risk of further events. Also includes lab screening and outpatient visits detailed in the costing section below.

International guidelines

Organization	Indications/recommendations	Applicability in LIC & Lower MIC settings
AHA/ASA, 2021	Stroke secondary prevention guideline	yes

Intervention attributes

Type of interventions

Prevention

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Delivery platform

This intervention may be delivered as part of routine care services predominantly at health centre level.

Equity

In addition to considerations like cost-effectiveness and health systems factors, dimensions of equity can be relevant for priority setting. The opportunity for a long and healthy life varies according to the severity of a health condition that individuals might have, so there are inequities in individuals' opportunities for long and healthy lives based on the health conditions they face. Metrics used to estimate the severity of illness at an individual level can be used to help prioritize those with less opportunity for lifetime health. FairChoices: DCP Analytics Tool uses Health adjusted age of death (HAAD), which is a metric that estimates the number of years lived from birth to death, discounting years lived with disability. A high HAAD thus represents a disease less severe in terms of lifetime health loss, while a low HAAD represents a disease that is severe on average, causing early death or a long period of severe disability. It is also possible to estimate the distribution of HAAD across individuals with a health condition. FairChoices shows for each intervention an average HAAD value of the conditions that are affected by respective interventions that have health effects. Additionally, a plot shows HAAD values for around 290 conditions (Johansson KA et al 2020).

Time dependence

Moderate level of urgency. Treatment outcomes not highly affected by some days of delay.

Population in need of interventions

Prevalent cases of ischaemic stroke for age group 30 to 99 years and 50% of ischemic strokes are due to atherosclerotic aetiologies and eligible for treatment. The treated fraction is therefore 0.5 for ischaemic stroke, and we consider 0.25 for intracerebral hemorrhage and 0.25 for subarachnoid hemorrhage.

Affected population and fraction is same as treated population and fraction, assuming 50% of ischemic strokes are due to atherosclerotic etiologies. The affected fraction is same as treated fraction.

Disease state addressed

Primary disease states addressed are ischaemic stroke, intracerebral hemorrhage and subarachnoid hemorrhage.

Intervention effect and safety

Table 1: Effect and safety of secondary prevention for stroke

Effect of intervention		Certainty of evidence
Mortality (due to condition)	Based on Tolla et al 2016	See appendix
ACEi	0.16	
ARB	0.16	
Aspirin	0.16	
Beta-blockers	0.16	
Statins	0.24	
Total relative reduction	=0.464*0.5=0.232	

Model assumptions

Table 2: Summary of model parameters and values used in FairChoices – DCP Analytical Tool

Category	Model parameter	Notes
Intervention	Secondary prevention of stroke	
Cost calculation		
Treated population	Based on prevalence of ischaemic stroke, intracerebral hemorrhage and subarachnoid hemorrhage.	Global Burden of Disease Study 2019
Gender	Both male & female	
Age	30 to 99 years	
Treated fraction Lab and outpatient visits ACE inhibitors ARB Aspirin Beta-blockers	 1 0.5 0.5 0.5 0.5	Assuming 50% are ischaemic strokes and 25% each for intracerebral hemorrhage and

Statins		subarachnoid hemorrhage
Effect calculation		
Affected population	Based on prevalence of ischaemic stroke	Global Burden of Disease Study 2019
Affected gender	Both male & female	
Affected fraction age	30 to 99 years	
Affected fraction Lab and outpatient visits ACEi* ARB* Aspirin Beta-blockers Statins	 1 0.5 0.5 0.5 0.5 0.5	
Comparison	No intervention	
Mortality Reduction (RRR)**	0.232	Tolla et 2016 & see table 1

*ACEi=Angiotensin converting enzyme inhibitors, ARB= Angiotensin II receptor blockers
**Relative risk reduction (RRR) estimated as 1-Relative risk (RR)

Intervention cost

Unit costs were calculated from a cost-effectiveness modelling study conducted in Tanzania (Ngalesoni et al 2016). Parameters listed below from this study were used to calculate a total unit cost of $101.05 (Ngalesoni et al 2016).

Drug regimen	**Proportion receiving drug regimen**	**Unit cost (in USD) of drug regimen**
ARB	0.25	64.83
		Value computed in the model=0.25*64.83=16.2
ACEi	0.75	14.1
		Value computed in the model=0.75*14.1=10.6

Beta-blockers	1	6.82
Statin	1	15.92
Aspirin	1	14.79
2 lab tests per year	1	=4.07*2=8.14
4 outpatient visits per year	1	=7.15*4=28.6
Total unit cost for the intervention secondary prevention for IHD		16.2+10.6+6.8+15.92+14.79+8.14+28.6= 101.05 USD

References

Johansson KA et al 2020: Johansson KA, Coates MM, Økland JM, Tsuchiya A, Bukhman G, Norheim OF, Haaland Ø. Health by disease categories. Distributional Cost-Effectiveness Analysis: Quantifying Health Equity Impacts and Trade-Offs. 2020 Sep 30:105.

Tolla et al 2016: Tolla et al. Prevention and treatment of cardiovascular disease in Ethiopia:a cost-effectiveness analysis. Cost Eff Resour Alloc. 2016. 14:10

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Appendix

Literature Review for effectiveness & safety

This literature search is an example of Level 1 search for intervention inputs taken from DCP3 or generated in an ad hoc manner (e.g., quick google search found one study of cervical cancer screening cost-effectiveness that was used to create an effectiveness parameter for that intervention).

Level of evidence of efficacy studies:

1. low (expert opinions, case series, reports, low-quality case control studies)
2. moderate (high quality case control studies, low quality cohort studies)
3. high (high quality cohort studies, individual RCTs)
4. very high (multiple RCTs, metaanalysis, systematic review, clinical practice guidelines).