5. Cochrane Database Syst Rev. 2020 May 7;5(5):CD013212. doi:
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Screening strategies for hypertension.

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Update of
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BACKGROUND: Hypertension is a major public health challenge
affecting more than
one billion people worldwide; it disproportionately affects
populations in low-
and middle-income countries (LMICs), where health systems are
generally weak.
The increasing prevalence of hypertension is associated with
population growth,
ageing, genetic factors, and behavioural risk factors, such as
excessive salt
and fat consumption, physical inactivity, being overweight and
obese, harmful
alcohol consumption, and poor management of stress. Over the long
term,
hypertension leads to risk for cardiovascular events, such as
heart disease,
stroke, kidney failure, disability, and premature mortality.
Cardiovascular
events can be preventable when high-risk populations are targeted,
for example,
through population-wide screening strategies. When available
resources are
limited, taking a total risk approach whereby several risk factors
of
hypertension are taken into consideration (e.g. age, gender,
lifestyle factors,
diabetes, blood cholesterol) can enable more accurate targeting of
high-risk
groups. Targeting of high-risk groups can help reduce costs in
that resources

are not spent on the entire population. Early detection in the form of screening
for hypertension (and associated risk factors) can help identify high-risk
groups, which can result in timely treatment and management of risk factors.
Ultimately, early detection can help reduce morbidity and mortality linked to it
and can help contain health-related costs, for example, those associated with
hospitalisation due to severe illness and poorly managed risk factors and
comorbidities.
OBJECTIVES: To assess the effectiveness of different screening strategies for
hypertension (mass, targeted, or opportunistic) to reduce morbidity and
mortality associated with hypertension.
SEARCH METHODS: An Information Specialist searched the Cochrane Register of
Studies (CRS-Web), the Cochrane Central Register of Controlled Trials (CENTRAL),
MEDLINE, Embase, Latin American Caribbean Health Sciences Literature (LILACS)
Bireme, ClinicalTrials.gov, and the World Health Organization International
Clinical Trials Registry Platform (WHO ICTRP) without language, publication
year, or publication status restrictions. The searches were conducted from
inception until 9 April 2020.
SELECTION CRITERIA: Randomised controlled trials (RCTs) and non-RCTs (NRCTs),
that is, controlled before and after (CBA), interrupted time series (ITS), and
prospective analytic cohort studies of healthy adolescents, adults, and elderly
people participating in mass, targeted, or opportunistic screening of
hypertension.
DATA COLLECTION AND ANALYSIS: Screening of all retrieved studies was done in
Covidence. A team of reviewers, in pairs, independently assessed titles and
abstracts of identified studies and acquired full texts for studies that were
potentially eligible. Studies were deemed to be eligible for full-text screening
if two review authors agreed, or if consensus was reached through discussion
with a third review author. It was planned that at least two review authors
would independently extract data from included studies, assess

risk of bias
using pre-specified Cochrane criteria, and conduct a meta-analysis of
sufficiently similar studies or present a narrative synthesis of the results.
MAIN RESULTS: We screened 9335 titles and abstracts. We identified 54
potentially eligible studies for full-text screening. However, no studies met
the eligibility criteria.
AUTHORS' CONCLUSIONS: There is an implicit assumption that early detection of
hypertension through screening can reduce the burden of morbidity and mortality,
but this assumption has not been tested in rigorous research studies.
High-quality evidence from RCTs or programmatic evidence from NRCTs on the
effectiveness and costs or harms of different screening strategies for
hypertension (mass, targeted, or opportunistic) to reduce hypertension-related
morbidity and mortality is lacking.

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Impacts of undetected and inadequately treated hypertension on incident stroke in China.

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OBJECTIVES: China carries the greatest burden of stroke given its
largest volume
of people with hypertension. This study assessed the impacts of
suboptimal
controls of hypertension on incident stroke and projected the
number of patients
with stroke saved after the control of blood pressure improved in
population.
SETTING: Anhui, China.
PARTICIPANTS: We examined data from the Anhui cohort of 2001-2011,
consisting of
3336 participants aged ≥60 years who were randomly recruited from
the urban and
rural Anhui. 2852 participants (89.2%) had hypertensive status
measured and no
stroke at baseline, and were followed up until 2011 in three
surveys using a
standard method of interview.
RESULTS: At baseline, 1646 participants (57.7%) were identified to
have
hypertension, among whom 912 (55.4%) were previously undetected,
115 (7.0%)
detected but not treated, 452 (27.5%) treated but not controlled
and only 127
(7.7%) controlled. During the 10-year follow-up, 211 incident
stroke cases

(12.8/1000 person-years) occurred. Compared with normotensive individuals at
baseline, multivariate adjusted HR for having stroke increased in those with
undetected hypertension by 1.63 (95%CI 1.15 to 2.32), untreated by 2.21
(1.26-3.85) and uncontrolled hypertension by 3.34 (2.28-4.88), but did not
differ from those with controlled hypertension (1.34; 0.60-2.99). Based on a
two-fold increase in the detection and management of current levels of
hypertension and algorithms on the current situation in China, approximately
250 000 incident stroke cases could be prevented annually.
CONCLUSIONS: In China, hypertension is frequently undetected or inadequately
treated. With appropriate management of hypertension, a substantial number of
people could be saved form stroke.

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Ambulatory blood pressure profile and stroke recurrence.

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OBJECTIVES: To establish a new ambulatory blood pressure (ABP) parameter
(24-hour ABP profile) and evaluated its performance on stroke outcome in
ischaemic stroke (IS) or transient ischaemic attack (TIA) patients.
METHODS: The prospective cohort consisted of 1996 IS/TIA patients enrolled for
ABP monitoring and a 3-month follow-up for stroke recurrence as outcome. Profile
groups of systolic blood pressure (SBP) were identified via an advanced
functional clustering method, and the associations of the profile groups and
conventional ABP parameters with stroke recurrence were examined in a Cox
proportional hazards model.
RESULTS: Three discrete profile groups (n=604, 781 and 611 in profiles 1, 2 and

3, respectively) in 24-hour ambulatory SBP were identified. Profile 1 resembled most to the normal diurnal blood pressure pattern; profile 2 also dropped at night, but climbed earlier and with higher morning surge; while profile 3 had sustained higher nocturnal SBP without significant nocturnal SBP decline. The incidence of stroke recurrence was 2.9%, 3.9% and 5.5% in profiles 1, 2 and 3, respectively. After adjustment for covariates, profile 3 was significantly associated with higher risk of stroke recurrence with profile 1 as reference (HR 1.76, 95% CI: 1.00 to 3.09), while no significant difference was observed between profiles 2 and 1 (HR 1.22, 95% CI: 0.66 to 2.25). None of conventional ABP parameters showed significant associations with the outcome. CONCLUSIONS: Ambulatory 24-hour SBP profile is associated with short-term stroke recurrence. Profiles of ABP may help improve identification of stroke recurrence by capturing the additive effects of individual ABP parameters.

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Visit-to-visit Systolic Blood Pressure Variability and Stroke Risk: A Systematic Review and Meta-analysis.

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Visit-to-visit variability in systolic blood pressure (SBP) may have an
important additional role in increasing the risk of vascular complications,
including stroke. We conducted a meta-analysis to assess the relationship
between visit-to-visit SBP variability (SBPV) and stroke risk. PubMed, EMBASE,
and the Cochrane library databases were searched for cohort studies with data on
visit-to-visit SBPV and stroke risk. Studies that reported adjusted relative
risks (RRs) with 95% CIs of stroke associated with SBPV were included. Fourteen
cohort studies met the inclusion criteria and were included in our

meta-analysis. After adjustment for age, sex, and existing vascular risk
factors, the analysis showed that the risk of stroke in patients with SBPV was
significantly increased compared with patients with a small baseline SBPV [SD
(RR=1.20, 95% CI=(1.07-1.35), P=0.0005), CV (RR=1.12, 95% CI=(1.00-1.26),
P=0.008)]. In addition, follow-up variations of more than 5 years were
associated with a higher risk of stroke than those of less than 5 years
[RR=1.08, 95% CI=(1.04-1.11)]. Visit-to-visit SBPV was associated with an
increased risk of stroke, especially in terms of the time of variation. Taken
together, SBPV data may be useful as a preventative diagnostic method in the
management of stroke.

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13. J Clin Hypertens (Greenwich). 2019 Aug;21(8):1108-1114. doi:
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Acute-phase blood pressure trajectories and clinical outcomes in ischemic stroke.

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High blood pressure (BP) is frequent in acute ischemic stroke (IS). However, the impact of BP change patterns during acute phase on clinical outcomes is not conclusive. This study aims to investigate the association between the acute-phase BP trajectories and clinical outcomes in IS patients with high admission BP. The cohort consisted of 316 IS patients with admission systolic BP (SBP) ≥160 mm Hg. SBP trajectories during the first 7 days after onset were characterized using a random effects model. The patients were classified into three groups based on the SBP trajectory curve parameters: sustained high SBP (T1), moderate decrease (T2), and rapid decrease in SBP (T3). Poor outcomes were defined as modified Rankin scale score ≥3 in 3 months after onset. The relationship between SBP trajectory groups and the outcome was examined in multivariable logistic regression models. The decreasing trend was greater in the favorable than in the poor outcome group (P = 0.028 for difference in linear

slopes). The incidence of poor outcomes was 25.9%, 13.5%, and 9.8% in T1
(n = 54), T2 (n = 170), and T3 (n = 92) groups, respectively. Compared with T1
group, the decrease in SBP in T2 and T3 groups was significantly associated with
lower risk of the poor outcome (odds ratio = 0.25, 95% confidence interval = 0.10-0.67, P = 0.006). These findings suggest that a decrease in BP
in the acute phase is predictive of favorable outcomes in IS patients. BP
trajectories have a greater power to detect the association than individual BP
values at one time-point.

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12. J Am Heart Assoc. 2022 Mar 15;11(6):e024158. doi: 10.1161/JAHA.121.024158. Epub
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Long-Term Blood Pressure Variability and Major Adverse Cardiovascular and
Cerebrovascular Events After Intracerebral Hemorrhage.

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Background Survivors of intracranial hemorrhage (ICH) are at increased risk for
major adverse cardiovascular and cerebrovascular events (MACCE), in the form of
recurrent stroke and myocardial Infarction. We investigated whether long-term
blood pressure (BP) variability represents a risk factor for MACCE after ICH,
independent of average BP. Methods and Results We analyzed data from prospective
ICH cohort studies at Massachusetts General Hospital and the University of Hong
Kong. We captured long-term (ie, visit-to-visit) BP variability, quantified as
individual participants' variation coefficient. We explored determinants of
systolic and diastolic BP variability and generated survival analyses models to
explore their association with MACCE. Among 1828 survivors of ICH followed for a
median of 46.2 months we identified 166 with recurrent ICH, 68 with ischemic
strokes, and 69 with myocardial infarction. Black (coefficient +3.8, SE 1.3) and
Asian (coefficient +2.2, SE 0.4) participants displayed higher BP variability.
Long-term systolic BP variability was independently associated with recurrent
ICH (subhazard ratio [SHR], 1.82; 95% CI, 1.19-2.79), ischemic stroke (SHR,
1.62; 95% CI, 1.06-2.47), and myocardial infarction (SHR, 1.54; 95% CI,
1.05-2.24). Average BP during follow-up did not modify the association between
long-term systolic BP variability and MACCE. Conclusions Long-term BP
variability is a potent risk factor for recurrent hemorrhage, ischemic stroke,
and myocardial infarction after ICH, even among survivors with well-controlled
hypertension. Our findings support the hypothesis that combined control of
average BP and its variability after ICH is required to minimize incidence of
MACCE.

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Hypertension-related stroke prevention in the elderly.

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Hypertension is a major risk factor for cardiovascular events, including
ischemic stroke and hemorrhagic stroke. Reduction of blood pressure by lifestyle
measures and antihypertensive drug therapy reduces stroke in elderly men and
women. The use of diuretics, beta blockers, calcium channel blockers,
angiotensin-converting enzyme inhibitors, or angiotensin receptor blockers
causes a similar reduction in reducing coronary events and stroke for a given
reduction in blood pressure. The American College of Cardiology Foundation/American Heart Association 2011 expert consensus document on
hypertension in the elderly recommended that the blood pressure should be
reduced to less than 140/90 mm Hg in adults younger than 80 years at high risk
for cardiovascular events. On the basis of data from the Hypertension in the
Very Elderly trial, these guidelines recommended that the systolic blood
pressure should be reduced to 140 to 145 mm Hg if tolerated in adults aged
80 years and older. The 2013 European Society of Hypertension guidelines
recommended that reducing blood pressure to less than 130/80 mm Hg in adults at
high risk for cardiovascular events was unsupported by prospective trial data.
The systolic blood pressure should be reduced to less than 140 mm Hg in these
adults and to between 140 to 150 mm Hg in adults aged 80 years and older.

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Risk probability and influencing factors of stroke in followed-up hypertension
patients.

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OBJECTIVE: To explore the risk probability and main influencing factors of
stroke in followed-up hypertension patients through the analysis of long-term
followed-up cohort data.
METHODS: The method of followed-up observation cohort was used to collect the
information of 168,417 followed-up hypertension patients from 2002 to 2020 in
Jiading District in Shanghai. Kaplan-Meier method was used to analyze the risk
probability of stroke complications in long-term followed-up HTN patients, and
the influencing factors were analyzed by Cox proportional risk model.
RESULTS: Among 168,417 followed-up hypertension patients, 11,143 cases had
suffered stroke, and the cumulative incidence rate of stroke was 6.62% (male was
6.87%, female was 6.37%). With the extension of the hypertension years, the
cumulative risk probability of stroke in HTN patients would continue to increase
and the interval was not equidistant. The total cumulative risk probability of
stroke in HTN patients was 78.9% (male was 91.0%, female was 70.7%). During the
period of hypertension, the risk occurring probability of stroke was not fixed,
but fluctuating. There were 4 onset peaks, which were in 8 years (probability
was 4.2%), 15 years (probability was 14.0%), 22 years (probability

was 6.0%) and
26 years (probability was 13.9%). The highest risk probability of
male patients
was in 26 years (probability was 23.1%), and the second peak was
in 15 years
(probability was 15.6%). The highest risk probability of female
patients was in
15 years (probability was 12.9%), and the second peak was in
26 years
(probability was 8.7%). The risk probability of different gender,
BP grade and
BMI was different, the male were at higher risk than the female,
stage 3 HTN was
higher than stage 2 and stage 1 HTN, obese people and underweight
people were at
higher risk than those who have normal weight. The main factors
closely related
to the occurrence of stroke complications were age (RR = 2.917,
p < 0.001), body
mass index (RR = 1.654, p < 0.001), family history of stroke
(RR = 1.386,
p < 0.001) and blood pressure grade (RR = 1.148, p < 0.001).
CONCLUSION: The risk probability of stroke among hypertension
patients was high
in followed-up hypertension patients (total 78.9%, male 91.0%,
female 70.7%),
and would continue to increase disproportionately during period of
hypertension
(4 different onset peaks). With the persistence of hypertension,
the risk
probability of stroke would increase continuously. Multivariate
Cox regression
analysis showed that male patients, patients with HBP, abnormal
BMI and positive
family history were main factors closely related to the occurrence
of stroke
complications.

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Does life satisfaction reduce risk of incident hypertension and

stroke? Evidence
from the Whitehall II cohort.

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BACKGROUND: Previous studies showed life satisfaction is related to reduced risk
of coronary heart disease and diabetes, but its association with other
cardiometabolic endpoints including hypertension and stroke remains unexplored.
This study examined life satisfaction's prospective association with incident
hypertension and stroke in middle-aged adults.
METHODS: At baseline (1985-1988), 6225 healthy British civil servants aged 35-55
from the Whitehall II cohort completed the validated Satisfaction with Life
Scale and provided information regarding sociodemographics, a range of
health-related factors, and psychological distress. Incident hypertension was
ascertained according to clinic-derived measures of systolic or diastolic blood
pressure of ≥140/90 mmHg, respectively, or self-reports of either
physician-diagnosed hypertension or hypertensive medication use. Incident stroke
and transient ischemic attack (TIA) were ascertained by self-reported physician
diagnosis. Follow-up assessments occurred every 2-5 years through 2017. Cox
proportional hazards regression models estimated hazard ratios (HR) and 95%

confidence intervals (CI) of hypertension and stroke/TIA risk separately.
RESULTS: Over a 31-year follow-up, 2703 cases of hypertension and 370 cases of stroke/TIA occurred. Life satisfaction was not related to risk of developing hypertension but was associated with 12% decreased risk of stroke/TIA after controlling for sociodemographics, health status, and health behaviors (HRper 1-SD = 0.88; 95%CI = 0.79-0.98). However, the association was attenuated after adjustment for psychological distress.
CONCLUSIONS: No robust associations were found between life satisfaction and incident hypertension and stroke/TIA, respectively, after accounting for well-established risk factors and psychological distress. More research is needed to understand why associations of life satisfaction with cardiometabolic health seem to vary across endpoints.

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