



The Latest evidence of HT management and dementia

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Topics

- Definition of dementia
- Burden of dementia: global, Thailand
- Risk factors of dementia
- Prevalence of high BP
- Mechanism of HT and cognitive impairment & dementia
- Evidence of HT treatment and dementia



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ภาวะสมองเสื่อม (dementia)

- ภาวะที่สมรรถภาพการทำงานของสมองถดถอยบกพร่อง ในด้านปริชาน (cognition) ได้แก่ ความจำ การตัดสินใจ การวางแผน การรับรู้ด้านมิติสัมพันธ์ (visuospatial function) การใช้ภาษา สมาธิหรือความใส่ใจ ความสามารถในการรับรู้เกี่ยวกับสังคมรอบตัว
- โดยมีผลกระทบต่อความสามารถในการประกอบกิจวัตรประจำวัน การทำงานและการเข้าสังคม
- แต่ต้องไม่มีอาการเพ้อ (delirium) โรคซึมเศร้า โรคทางจิตเวชเรื้อรัง หรือวิตกกังวลรุนแรงขณะวินิจฉัย




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Activities of Daily Living (ADL)

Impaired ADL?

 Personal hygiene


 Dressing


 Eating


 Toilet


 Transfer


Impaired iADL?


 Communication : phone, email, text


 Transportation : driving, public transport

 Meal preparation

 Shopping

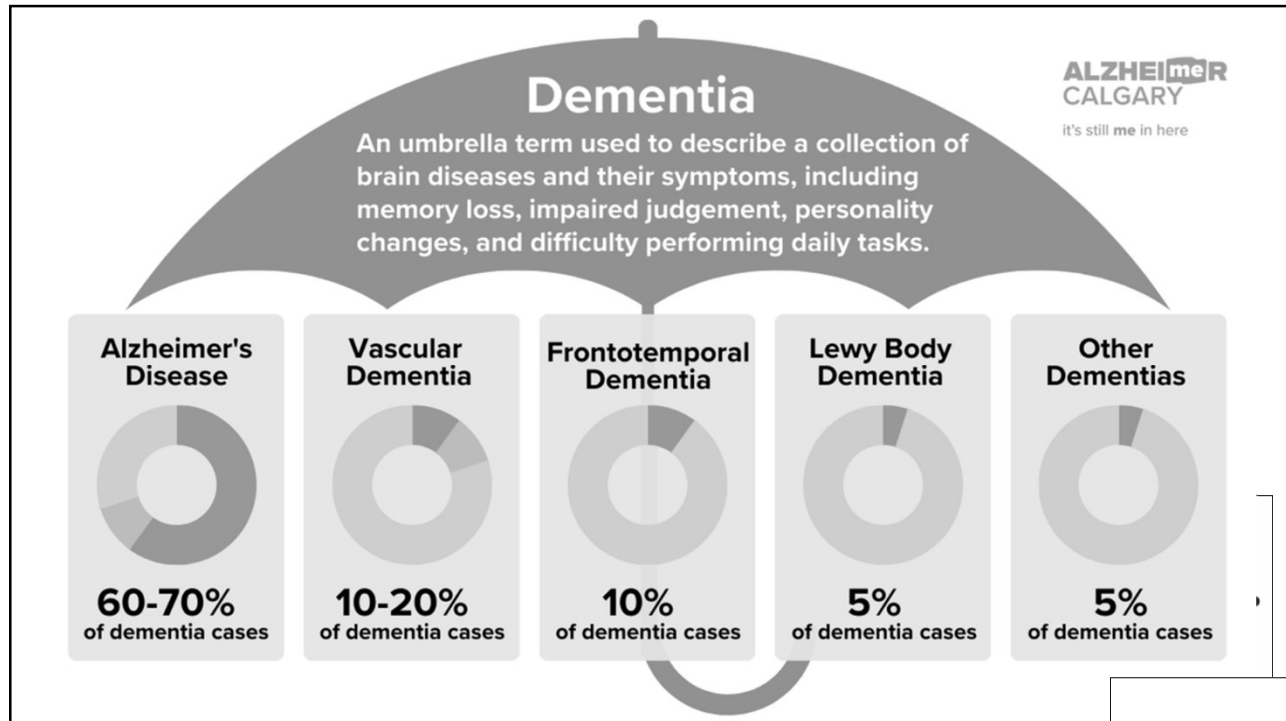
 Housework

 Manage medication

 Manage personal finance

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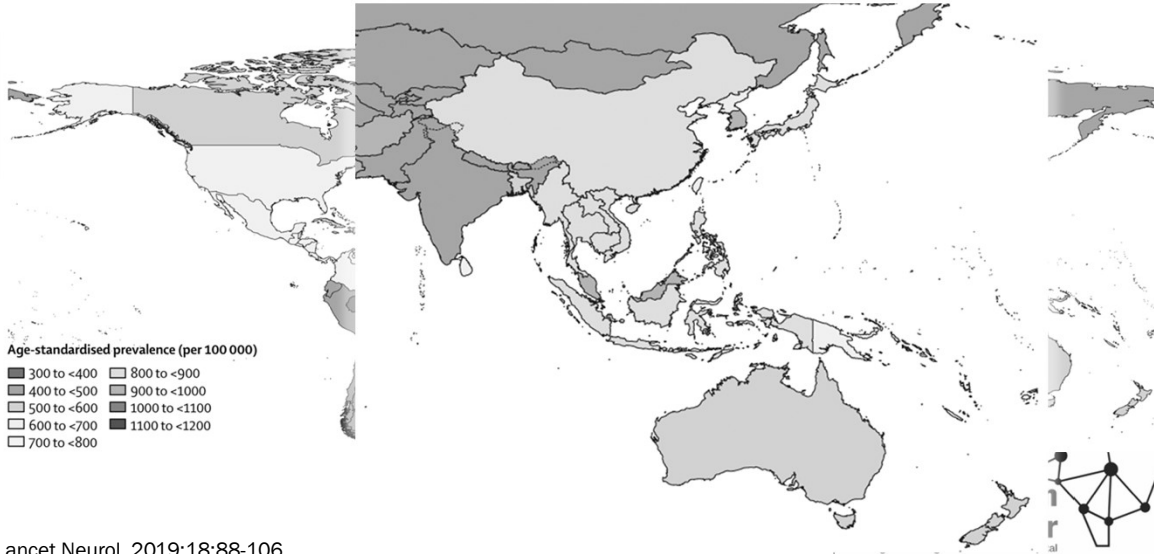
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Global Burden of Dementia



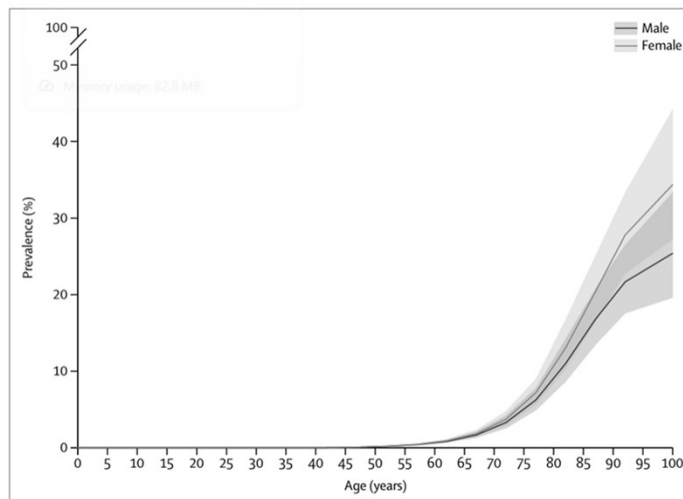
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Age-standardised prevalence of dementia per 100 000 population by location for both sexes, 2016



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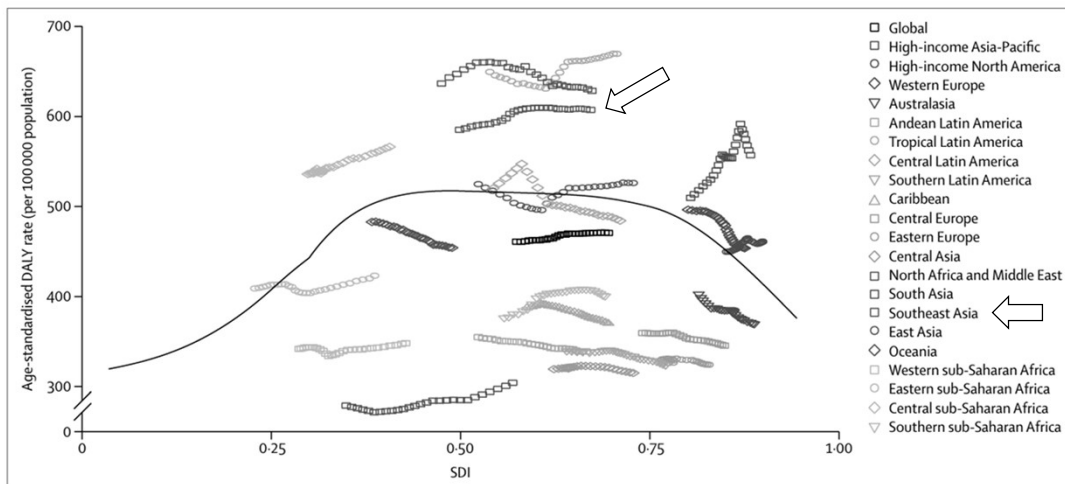
Global age-standardised prevalence of dementia by sex, 2016



Lancet Neurol. 2019;18:88-106.

8

Age-standardised disability-adjusted-life-year (DALY) rates of dementia by Socio-demographic Index (SDI), 1990–2016

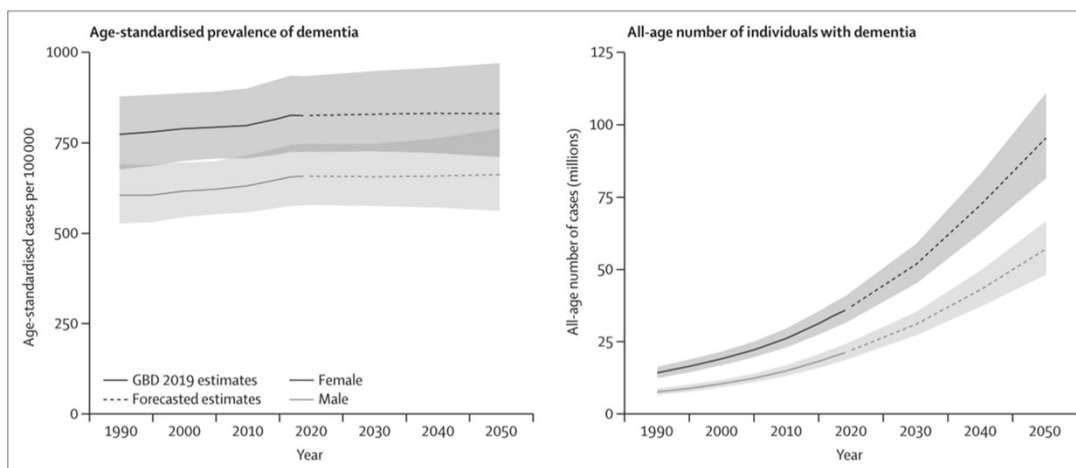


Lancet Neurol. 2019;18:88-106.

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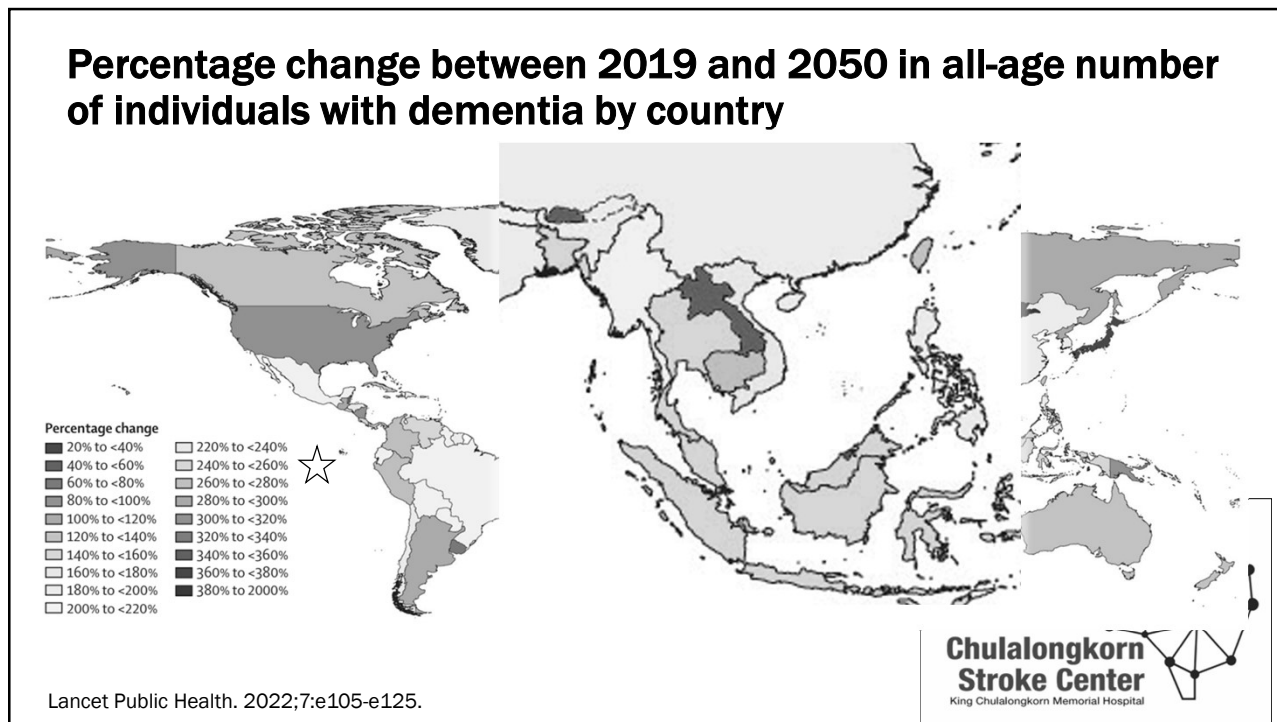
Estimated trends in the global age-standardised dementia prevalence (A) and all-age number of cases (B)



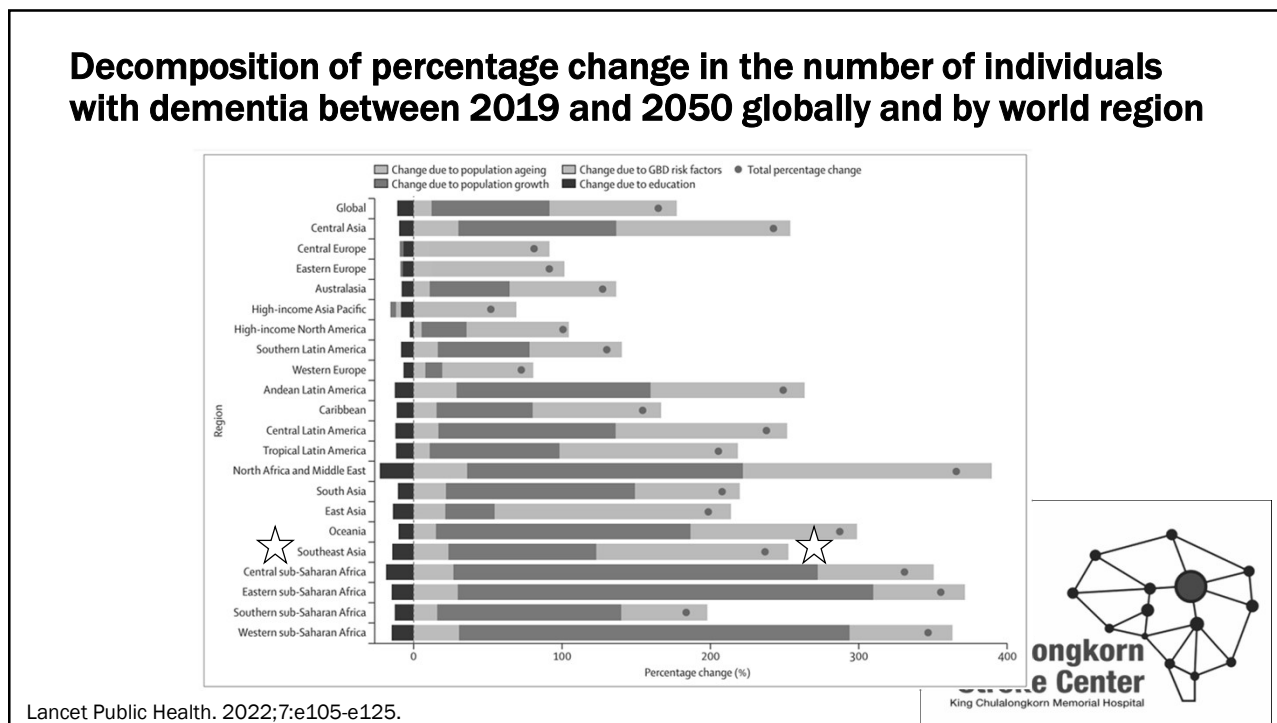
Lancet Public Health. 2022;7:e105-e125.

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Burden of Dementia in Thailand



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BOD การสูญเสียปีสุขภาวะ
Disability-Adjusted Life Years: DALYs
รายงานการโรคและการบาดเจ็บของประชากรไทย พ.ศ. 2557

มูลนิธิเพื่อการพัฒนาคุณภาพระหว่างประเทศ
สำนักงานพัฒนาคุณภาพระหว่างประเทศ
แผนงานการพัฒนาดัชนีภาวะทางสุขภาพเพื่อการพัฒนาคุณภาพ
ตีพิมพ์ 2560

สาเหตุการตายของไทย พ.ศ. 2557

ลำดับ	ชาย				หญิง			
	สาเหตุ	Deaths ('000)	%	%	Deaths ('000)	สาเหตุ		
1	หลอดเลือดสมอง	30	11.1	14.6	31	หลอดเลือดสมอง		
2	หัวใจขาดเลือด	21	7.8	8.8	19	เบาหวาน		
3	อุบัติเหตุทางถนน	20	7.4	8.8	19	หัวใจขาดเลือด		
4	มะเร็งตับ	18	6.5	4.0	8	ไตอักเสบและไตพิการ		
5	ปอดอุดกั้นเรื้อรัง	17	6.0	3.7	8	มะเร็งตับ		

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BOD Burden of Disease Thailand

การสูญเสียปีสุขภาวะ
Disability-Adjusted Life Years: DALYs
รายงานการโรคและการบาดเจ็บของประเทศไทย พ.ศ. 2562

IHPP Thailand

สสส

สำนักงานพัฒนานโยบายสุขภาพระหว่างประเทศ
แผนงานพัฒนาดัชนีภาวะโรคแห่งประเทศไทย
ตีพิมพ์ 2566

สาเหตุการตายของไทย พ.ศ. 2562

ลำดับ	ชาย			หญิง		
	โรค	Deaths ('000)	%	%	Deaths ('000)	โรค
1	หลอดเลือดสมอง	38	12.0	14.9	36	หลอดเลือดสมอง
2	เบาหวาน	30	9.7	14.8	36	เบาหวาน
3	หัวใจขาดเลือด	28	8.8	7.1	17	อัลไซเมอร์และภาวะสมองเสื่อมอื่นๆ
4	การบาดเจ็บทางถนน	24	7.8	6.4	15	หัวใจขาดเลือด
5	มะเร็งตับ	16	5.3	3.6	9	การบาดเจ็บทางถนน

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BOD Burden of Disease Thailand

การสูญเสียปีสุขภาวะ
Disability-Adjusted Life Years: DALYs
รายงานการโรคและการบาดเจ็บของประเทศไทย พ.ศ. 2557

มูลนิธิเพื่อการพัฒนาสุขภาพระหว่างประเทศ
สำนักงานพัฒนานโยบายสุขภาพระหว่างประเทศ
แผนงานการพัฒนาดัชนีภาวะทางสุขภาพเพื่อการพัฒนา
ตีพิมพ์ 2560

การสูญเสียปีสุขภาวะของไทย อายุ 60 ปีขึ้นไป พ.ศ.2557

ลำดับ	ชาย			หญิง		
	สาเหตุ	DALYs ('000)	%	%	DALYs ('000)	สาเหตุ
1	หลอดเลือดสมอง	253	11.2	11.2	281	หลอดเลือดสมอง
2	ปอดอุดกั้นเรื้อรัง	196	8.7	11.0	276	เบาหวาน
3	หัวใจขาดเลือด	175	7.7	7.7	194	สมองเสื่อม
4	เบาหวาน	132	5.8	7.0	175	หัวใจขาดเลือด
5	มะเร็งตับ	131	5.8	3.6	91	ข้อเสื่อม

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BOD Burden of Disease Thailand

การสูญเสียปีสุขภาวะ
Disability-Adjusted Life Years: DALYs
รายงานการโรคและการบาดเจ็บของประเทศไทย พ.ศ. 2562

iHPP Thailand

สสส
สำนักงานสนับสนุนนโยบายสุขภาพระหว่างประเทศ
แผนงานพัฒนาดัชนีการะโรคแห่งประเทศไทย
ตีพิมพ์ 2566

การสูญเสียปีสุขภาวะของไทย อายุ 60 ปีขึ้นไป พ.ศ. 2562

ลำดับ	ชาย			หญิง		
	โรค	DALYs ('000)	%	%	DALYs ('000)	โรค
1	หลอดเลือดสมอง	485	11.8	15.1	555	เบาหวาน
2	เบาหวาน	446	10.8	12.9	474	หลอดเลือดสมอง
3	หัวใจขาดเลือด	321	7.8	5.8	215	หัวใจขาดเลือด
4	มะเร็งตับ	222	5.4	4.3	160	ไตเรื้อรัง
5	ปอดอุดกั้นเรื้อรัง	214	5.2	4.3	158	อัลไซเมอร์และ ภาวะสมองเสื่อมอื่นๆ



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Modifiable risk factors of Dementia



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Modifiable Risk Factors of dementia



Did you know that there are known risks for **Alzheimer's disease and related dementias**?

not enough aerobic physical activity	cigarette smoking	excessive alcohol use	obesity
hypertension	diabetes	depression	hearing loss

Keep your brain healthy!
Talk to your health care provider about things you can do to reduce your risk

 bit.ly/mm7120a2  

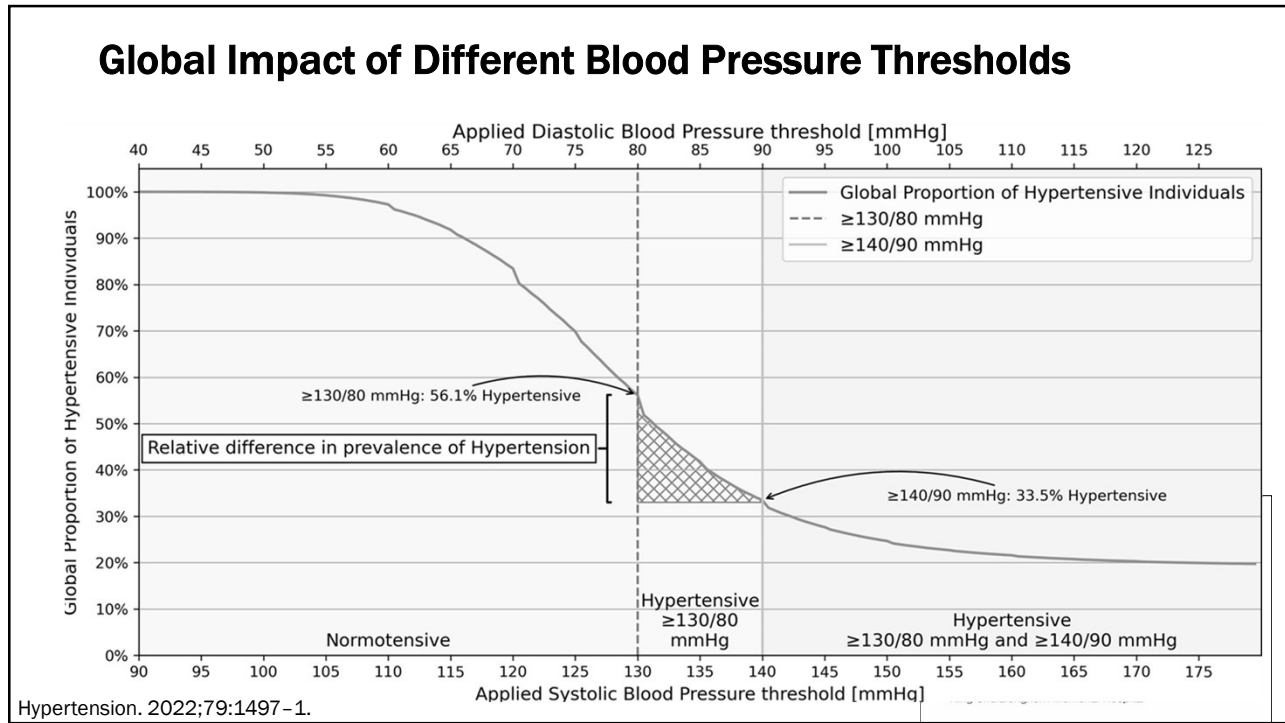
MAY 20, 2022

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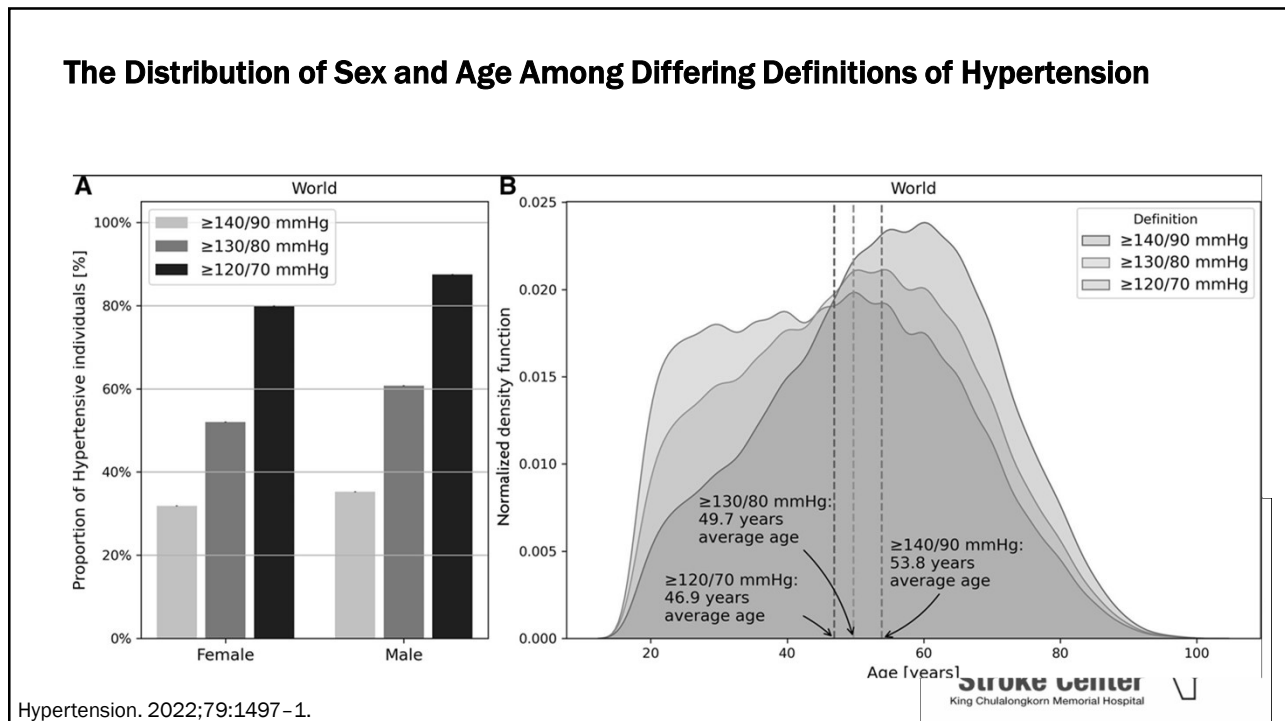
Prevalence of high blood pressure



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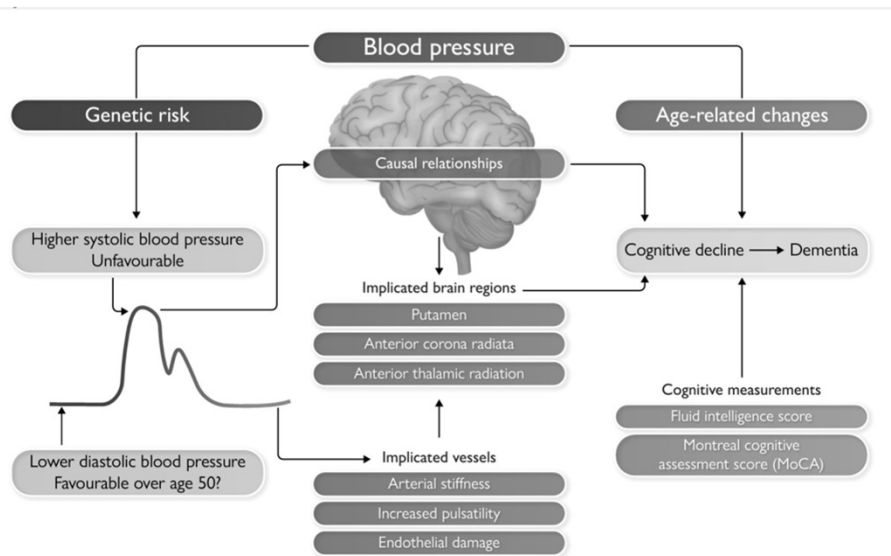
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HT and cognitive impairment & dementia

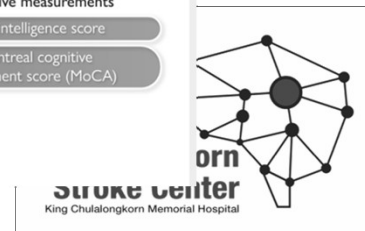


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The causal relationship of blood pressure to affected brain structures that result in cognitive decline and progression to dementia



Eur H J 2023;44:2126–2128.



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Common pathophysiology for VaD and AD.

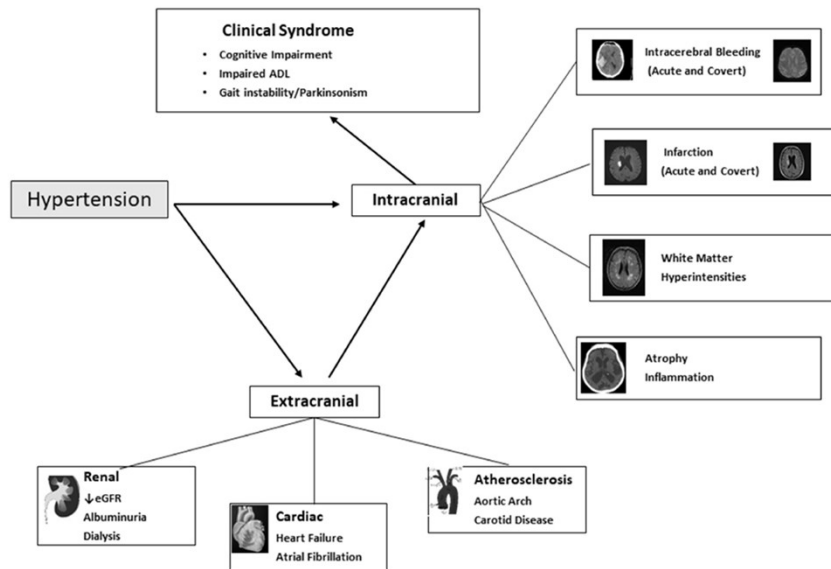


Am J Hypertens 2010; 23:116-124.



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HT and cognitive impairment and dementia



Front. Neurol. 2022;13:821135.



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Evidence of HT treatment and cognitive impairment & dementia



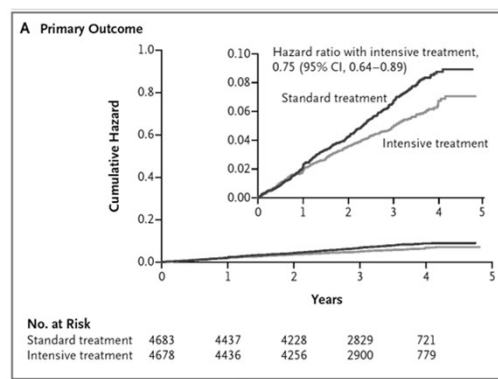
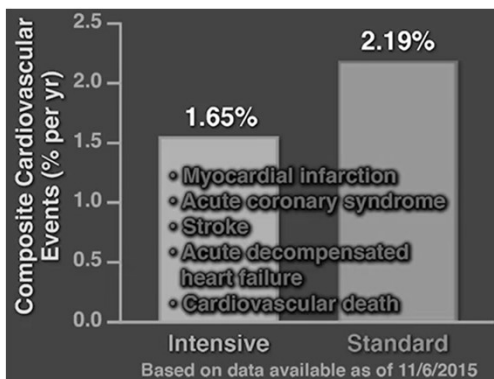
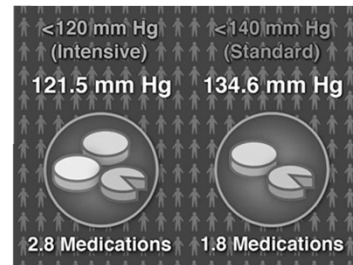
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A Randomized Trial of Intensive versus Standard Blood-Pressure Control **SPRINT**

The SPRINT Research Group*

- 9,361 patients ≥ 50 y with SBP ≥ 130 mmHg,
 - And increased cardiovascular risk without DM
- Target: < 120 mmHg (Intensive Rx) vs < 140 mmHg (Standard Rx)
- Median F/U 3.26 y

N Engl J Med 2015;373:2103-16.



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JAMA | Original Investigation

Effect of Intensive vs Standard Blood Pressure Control on Probable Dementia

A Randomized Clinical Trial

SPRINT MIND

The SPRINT MIND Investigators for the SPRINT Research Group

JAMA. 2019;321:553-561.

- Objective: To evaluate the effect of intensive blood pressure control on risk of dementia
- The median intervention period 3.34 years. a total median follow-up of 5.11 years

Table 2. Incidence of Probable Dementia and Mild Cognitive Impairment by Treatment Group

Primary cognitive outcome	Intensive		Standard		Hazard Ratio (95% CI) ^a	P Value
	No. With Outcome/Person-Years	Cases per 1000 Person-Years	No. With Outcome/Person-Years	Cases per 1000 Person-Years		
Probable dementia	149/20 569	7.2	176/20 378	8.6	0.83 (0.67-1.04)	.10
Mild cognitive impairment ^b	287/19 690	14.6	353/19 281	18.3	0.81 (0.69-0.95)	.007
Composite of mild cognitive impairment or probable dementia	402/19 873	20.2	469/19 488	24.1	0.85 (0.74-0.97)	.01

Among adults with HT, intensive BP control did not significantly reduce the risk of probable dementia.

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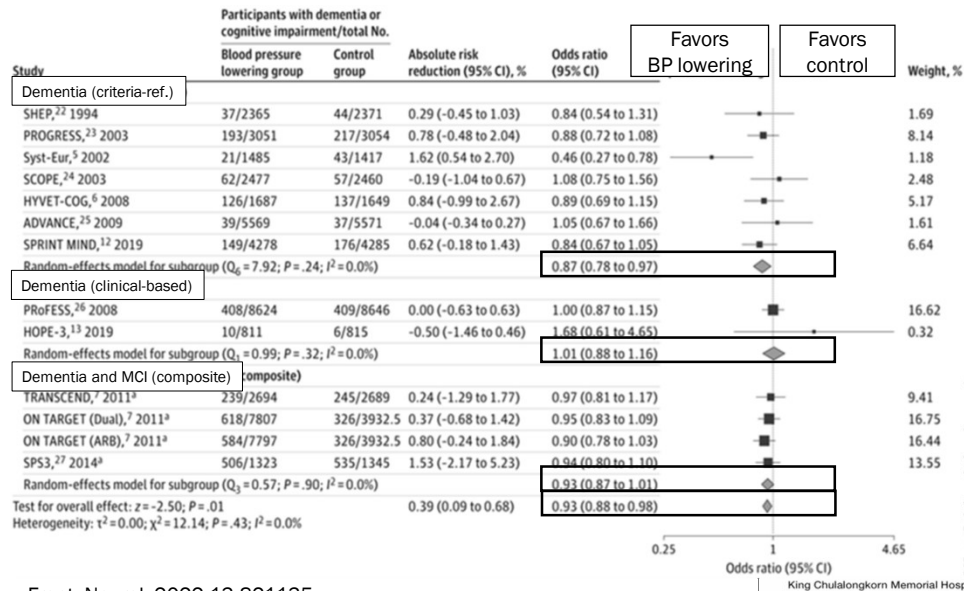
Components of the SPRINT Cognitive Battery

	Components of In-Person Cognitive Screening Battery	Components of In-Person Cognitive Extended Battery	Components of Telephone Cognitive Battery
Global Functioning	Montreal Cognitive Assessment		Modified Telephone Interview for Cognitive Status
Executive Function	Digit Symbol Coding Test		
Speed of Processing		Trail Making Test Parts A and B	Oral Trail Making Test Parts A and B
Learning and Memory	Logical Memory I	Hopkins Verbal Learning Test-Revised	
Visual-Spatial Memory		Modified Rey-Osterreith Complex Figure	
Working Memory and Attention		Digit Span Forward and Backward	
Verbal Fluency		Category Fluency-Animals	Category Fluency-Animals
Language and Naming		Boston Naming Test	



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Meta-analysis of blood pressure lowering randomized controlled trials



Front. Neurol. 2022;13:821135.

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China Rural Hypertension Control Project (CRHC)



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Prevalence and control of hypertension among rural and urban residents in China

Am J Hypertens. 2021;34:831-839.

	China PEACE (2014–2017)	China Hypertension Survey (2012–2015)	China CDRFS Survey (2013–2014)	China NSCKD (2009–2010)	China PURE Study (2005–2009)
Study participants	1.7 million community-dwelling adults aged 35–75 years from all 31 provinces in China	A nationally representative sample of 451,755 adults aged ≥18 years from all 31 provinces in China	A nationally representative sample of 174,621 adults aged ≥18 years from all 31 provinces in China	A multistage, stratified sample of 50,171 adults aged ≥18 years from 13 provinces in China	45,108 adults aged 35–70 years from 70 rural and 45 urban communities in 12 provinces in China
BP measures	Two measures using an automatic BP monitor (Omron HEM-7430)	Three measures using an automatic BP monitor (OMRON HBP-1300)	Two measures using an automatic BP monitor (OMRON HBP-1300)	Three measures using a mercury sphygmomanometer	Two measures using an automatic BP monitor (Omron HEM-757)
Prevalence, %	44.7	23.2	27.8	29.6	41.9
Rural	46.1	23.1	31.6	29.0	41.9
Urban	42.5	23.4	32.3	32.0	38.4
Awareness, %	44.7	46.9	31.9	42.6	41.6
Rural	43.8	44.7	20.1	39.9	35.5
Urban	46.3	50.9	32.5	50.9	47.2
Treatment, %	30.1	40.7	26.4	34.1	34.4
Rural	28.2	38.0	14.9	30.1	26.8
Urban	33.4	45.8	26.8	46.7	39.9
Control, %	7.2	15.3	9.7	9.3	8.2
Rural	6.1	13.1	5.5	6.4	4.4
Urban	9.1	19.4	10.1	18.5	10.8



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China Rural Hypertension Control Project (CRHC)

- a cluster randomized trial
- To test the effectiveness of a village doctor-led multifaceted intensive BP intervention among pts with HT in rural China on
 - hypertension control in 18 months (Phase 1)
 - cardiovascular disease risk in 36 months (Phase 2)
 - and all-cause dementia in 48 months (Phase 3)
- 326 villages from 3 provinces in mainland China, stratified by provinces, counties, and townships
 - 163 villages: a village doctor-led multifaceted intervention
 - 163 villages: usual care



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Implementation strategies

Health systems

Establishing an organizational structure at city/county, town, and village levels for chronic disease management

Using hypertension control rate as one of the metrics for resource allocation

Providing the lowest discount or free medications for antihypertensive treatment according to the China rural health reform plan

Village doctors

Training village doctors to measure BP according to a standard protocol

Training village doctors to use a simple step-wise protocol for BP management

Training village doctors to conduct health coaching on lifestyle change (e.g., lowering sodium and alcohol intake) and medication adherence

Patients

Training patients to self-monitor home BP

Encouraging lifestyle change and medication adherence

Connecting patients through WeChat or telephone for group social support

Am J Hypertens. 2021;34:831-839.



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Eligibility criteria for villages and study participants

Eligibility criteria for villages

The village has a regular village doctor who is willing to participate in the hypertension control project

The village does not plan to merge with other villages within 3 years

The village is at least 2 km away from other participating villages

The village participates in the China New Rural Cooperative Medical Scheme

Eligibility criteria for study participants

Men or women aged ≥ 40 years

Mean untreated systolic BP ≥ 140 mm Hg and/or diastolic BP ≥ 90 mm Hg or mean treated systolic BP ≥ 130 mm Hg and/or diastolic BP ≥ 80 mm Hg for individuals without a history of clinical cardiovascular diseases; or mean treated/untreated systolic BP ≥ 130 mm Hg and/or diastolic BP ≥ 80 mm Hg for individuals with a history of clinical coronary heart disease, heart failure, stroke, diabetes, or chronic kidney disease

Have lived in a participating village for at least 6 months

No intention to migrate within next 3 years

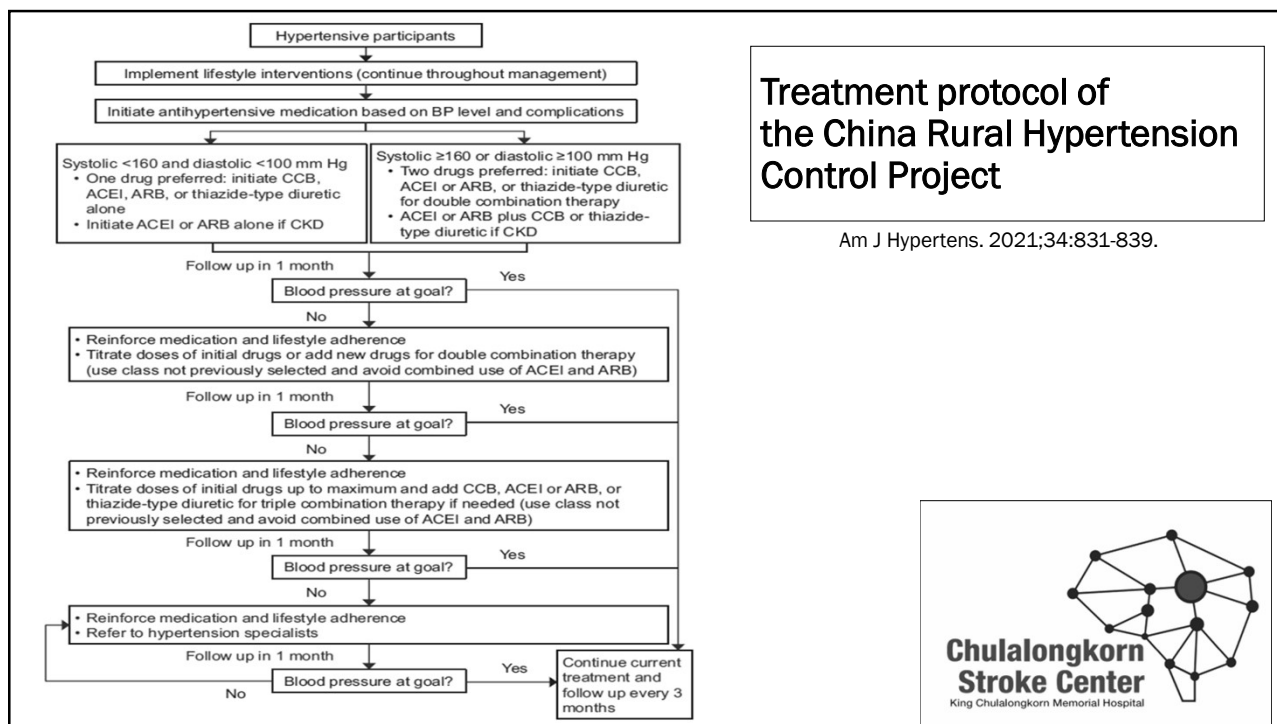
Taking part in the New Rural Cooperative Medical Scheme

Not pregnant or planning to become pregnant

No malignant tumors and life expectancy ≥ 3 years

Willing to participate and able to sign informed consent

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CRHCP: China Rural Hypertension Control Project

Lancet 2022; 399: 1964–75.

- To test the effectiveness of a village doctor-led multifaceted intervention compared to usual care on BP control over 18 months among rural residents with HT in China.

	Intervention (n=17,407)	Control (n=16,588)	Net difference	P value
Primary Endpoints				
BP <130/80 mmHg, %	57.0	19.9	37.0	<0.001
Secondary Endpoints				
BP<140/90 mmHg, %	77.3	44.5	32.7	<0.001
Change in SBP, mmHg	-26.3	-11.8	-14.5	<0.001
Change in DBP, mmHg	-14.6	-7.5	-7.1	<0.001

the village doctor-led intervention significantly improved BP control among rural residents in China.

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CRHCP: on cardiovascular disease, 36 months

Lancet 2023; 401: 928–38.

	Intervention		Usual care		Hazard ratio (95% CI); p value*	Multiple-adjusted hazard ratio (95% CI); p value†
	Number of events	Rate per year	Number of events	Rate per year		
Primary outcome						
Cardiovascular disease (myocardial infarction, stroke, heart failure, or cardiovascular disease death)	808	1.6%	1127	2.4%	0.67 (0.61–0.73); p<0.0001	0.64 (0.58–0.70); p<0.0001
Secondary outcomes						
Myocardial infarction	105	0.2%	129	0.3%	0.77 (0.60–0.98); p=0.037	0.74 (0.58–0.95); p=0.019
Stroke	640	1.3%	902	1.9%	0.66 (0.60–0.73); p<0.0001	0.63 (0.57–0.70); p<0.0001
Heart failure	47	0.1%	74	0.2%	0.58 (0.42–0.81); p=0.0016	0.55 (0.39–0.78); p=0.0007
Death from cardiovascular causes	200	0.4%	269	0.6%	0.70 (0.58–0.83); p<0.0001	0.68 (0.57–0.82); p<0.0001
Death from all causes	691	1.4%	776	1.6%	0.85 (0.76–0.95); p=0.0037	0.86 (0.78–0.96); p=0.0055
Primary outcome or death	1290	2.6%	1623	3.5%	0.75 (0.70–0.80); p<0.0001	0.73 (0.68–0.78); p<0.0001

CIs were not adjusted for multiple comparisons and should not be used in place of hypothesis testing. *In the marginal Cox models, village was used as a random effect and the stratification variables (province, county, and township) as fixed effects. †Additionally adjusted for age, sex, cigarette smoking, use of antihypertensive medication, history of cardiovascular disease, and baseline systolic blood pressure, low-density lipoprotein cholesterol, and fasting plasma glucose.

Chulalongkorn

Effectiveness of a non-physician community health-care provider-led intervention

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#AHA23

Effectiveness of Blood Pressure Lowering Intervention on Risk of Total Dementia among Patients with Hypertension A Cluster-Randomized Effectiveness Trial

Jiang He, Chuansheng Zhao, Shanshan Zhong, Nanxiang Ouyang, Lixia Qiao, Ruihai Yang, Chunxia Zhao, Huayan Liu, Weiyu Teng, Xu Liu, Jessica Spat-Lemus, Chung-Shiuan Chen, Clara Li, Jeff D. Williamson, and Yingxian Sun

No conflicts of interest to declare.



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Background

- It is estimated that the global number of individuals living with dementia would increase from 57.4 million in 2019 to 152.8 million in 2050.
- In the absence of curative treatment, the primary prevention of dementia through risk factor reduction, such as blood pressure lowering, becomes a public health priority.
- Previous randomized controlled trials have lacked sufficient duration or sample size and reported a nonsignificant reduction in dementia associated with antihypertensive treatment in patients with hypertension or a history of stroke.

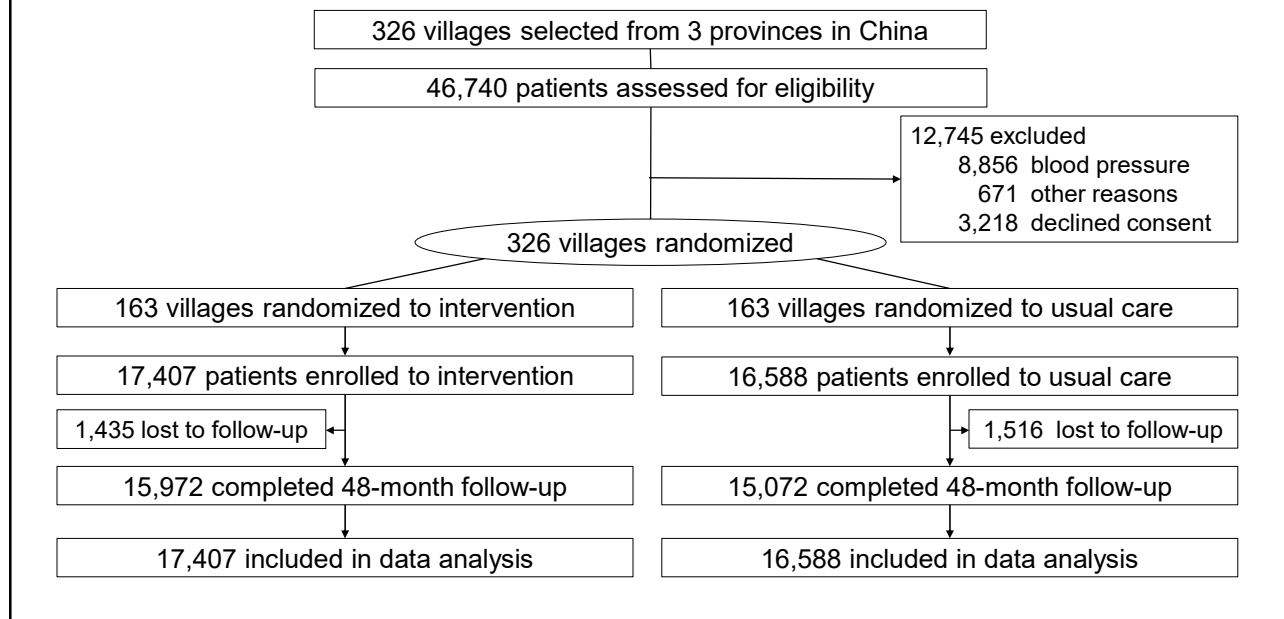
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Objectives

- To test the effectiveness of intensive blood pressure intervention compared to usual care in reducing the risk of all-cause dementia and cognitive impairment among patients with hypertension over a 48-month intervention period.

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Enrollment, Randomization, and Follow-up



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Study Participants

- Men and women aged ≥ 40 years with a mean untreated systolic BP ≥ 140 mmHg and/or diastolic BP ≥ 90 mmHg or mean treated systolic BP ≥ 130 mmHg and/or diastolic BP ≥ 80 mmHg from six measures on two different days were eligible for this trial.
- In addition, patients with a history of CVD, CKD, or diabetes and mean systolic BP ≥ 130 mmHg and/or diastolic BP ≥ 80 mmHg were eligible.
- Participants were required to be enrolled in the China New Rural Cooperative Medical Scheme, which covers 99% of rural residents for basic healthcare services.

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Village Doctor-led Intervention

- A simple stepped-care protocol for hypertension treatment was implemented to achieve a target systolic BP <130 mmHg and diastolic BP <80 mmHg.
- Village doctors initiated and titrated antihypertensive medications based on the treatment protocol, delivered discounted and free medications to patients, conducted health coaching on lifestyle modification and medication adherence, and instructed patients on home BP monitoring.
- Primary care physicians and hypertension specialists provided training, supervision, and consultation.


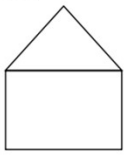

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Data Collection

- At the 48-month follow-up visit, trained and certified neurologists, who were blinded to randomization assignments, collected data on:
 - Medical and psychiatric history and risk factors for dementia
 - Neurological assessment, including a mental status evaluation
 - The Mini-Mental State Examination (MMSE): a 30-point questionnaire widely used to screen for cognitive impairment.
 - The Functional Activities Questionnaire (FAQ): a 10-item questionnaire measures instrumental activities of daily living. It has been widely used for differentiating functional independence in patients with dementia and mild cognitive impairment.
 - The Quick Dementia Rating System (QDRS): a 10-domain questionnaire validly and reliably differentiates individuals with and without dementia and accurately stages dementia.

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MMSE (Mini-Mental State Examination)
TMSE (Thai Mental State Examination)

<table style="width: 100%; border-collapse: collapse;"> <tr> <th style="text-align: left;">Maximum</th> <th style="text-align: left;">Score</th> </tr> <tr> <td>5</td> <td>()</td> </tr> <tr> <td>5</td> <td>()</td> </tr> <tr> <td>3</td> <td>()</td> </tr> <tr> <td>5</td> <td>()</td> </tr> <tr> <td>3</td> <td>()</td> </tr> <tr> <td>2</td> <td>()</td> </tr> <tr> <td>1</td> <td>()</td> </tr> <tr> <td>3</td> <td>()</td> </tr> <tr> <td>1</td> <td>()</td> </tr> <tr> <td>1</td> <td>()</td> </tr> <tr> <td>1</td> <td>()</td> </tr> </table>	Maximum	Score	5	()	5	()	3	()	5	()	3	()	2	()	1	()	3	()	1	()	1	()	1	()	<p>Orientation What is the (year) (season) (date) (day) (month)? Where are we (state) (country) (town) (hospital) (floor)?</p> <p>Registration Name 3 objects: 1 second to say each. Then ask the patient all 3 after you have said them. Give 1 point for each correct answer. Then repeat them until he/she learns all 3. Count trials and record. Trials _____</p> <p>Attention and Calculation Serial 7s. 1 point for each correct answer. Stop after 5 answers. Alternatively spell "world" backward.</p> <p>Recall Ask for the 3 objects repeated above. Give 1 point for each correct answer.</p> <p>Language Name a pencil and watch. Repeat the following "No ifs, ands, or buts" Follow a 3-stage command: "Take a paper in your hand, fold it in half, and put it on the floor." Read and obey the following: CLOSE YOUR EYES Write a sentence. Copy the design shown.</p> <div style="text-align: center;">  </div> <p style="text-align: center;">Total Score _____ ASSESS level of consciousness along a continuum _____ Alert Drowsy Stupor Coma</p>	<p style="text-align: center;">Thai Menta</p> <p>1. Orientation (6 คะแนน) ผู้ทดสอบ 1.1 วันนี้ เป็นวันอะไร 1.2 วันนี้ เป็นเดือนอะไร 1.3 เดือนนี้ เดือนอะไร 1.4 ขณะนี้เป็นช่วงเวลาอะไรของ 1.5 ปีนี้ 1.6 คนที่ทำงานที่ออกชื่ออะไร</p> <p>2. Registration (3 คะแนน) ผู้ทดสอบถามชื่อคนชื่ออะไร <input type="radio"/> ส้มไม้ <input type="radio"/> รอนซ์</p> <p>3. Attention (5 คะแนน) ให้ผู้ทดสอบไปเป็นวันเสาร์ ออกชื่ออะไร <input type="radio"/> ศุกร์ <input type="radio"/> พฤหัสบดี</p> <p>4. Calculation (3 คะแนน) ผู้ทดสอบ _____ <input type="radio"/> _____</p> <p>5. Language (10 คะแนน) 5.1 ผู้ทดสอบให้กระดาษสีขาว 5.2 ผู้ทดสอบให้กระดาษสีขาว 5.3 ผู้ทดสอบให้ผู้ทดสอบออกเสียงของ 3 อย่างที่ให้จำเมื่อสักครู่มีอะไรบ้าง "ขยายพยางค์ในชื่อของคุณ" 5.4 ผู้ทดสอบให้ผู้ทดสอบออกเสียง "สวัสดี" 5.5 ผู้ทดสอบให้ผู้ทดสอบ</p> <p>5.6 ผู้ทดสอบให้ผู้ทดสอบวาดบ้านตามแบบที่เห็นให้เหมือนบ้านของตัวเองที่สุด _____ <input type="checkbox"/> (2 คะแนน)</p> <div style="text-align: center;">  </div> <p>5.7 ผู้ทดสอบให้ผู้ทดสอบวาด "ล้อรถกับเส้นหมึกบนพื้นผิวเป็นวงกลม" _____ <input type="checkbox"/> (3 คะแนน) ผู้ทดสอบให้ผู้ทดสอบออกเสียงของ 3 อย่างที่ให้จำเมื่อสักครู่มีอะไรบ้าง <input type="radio"/> ส้มไม้ <input type="radio"/> รอนซ์ <input type="radio"/> มิถุนายน</p> <p style="text-align: right;">รวมคะแนน <input style="width: 50px;" type="text"/></p> <p>เกณฑ์การประเมิน คะแนนเต็ม 30 คะแนน ถ้าได้คะแนนรวม <24 คะแนน ถือว่า มีภาวะ Cognitive impairment คือมีความผิดปกติด้านความสามารถของสมองโดยเฉาะความจำ</p> <div style="text-align: center;">  </div>
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"MINI-MENTAL STATE," A PRACTICAL METHOD FOR GRADING THE COGNITIVE STATE OF PATIENTS FOR THE CLINICIAN.
Journal of Psychiatric Research. 12(3): 189-198. 1975. Used by permission.

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Study Outcomes

- Primary outcome is all-cause dementia defined according to the Recommendations from the National Institute on Aging-Alzheimer's Association workgroups on diagnostic guidelines for Alzheimer's disease.
- Main secondary outcome is cognitive impairment no dementia (CIND).
- Other secondary outcomes included a composite outcome of dementia or CIND, and a composite outcome of dementia or deaths.
- The final diagnosis of all-cause dementia or CIND was made by an expert adjudication panel who were blinded to the intervention assignment.

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Statistical Analysis

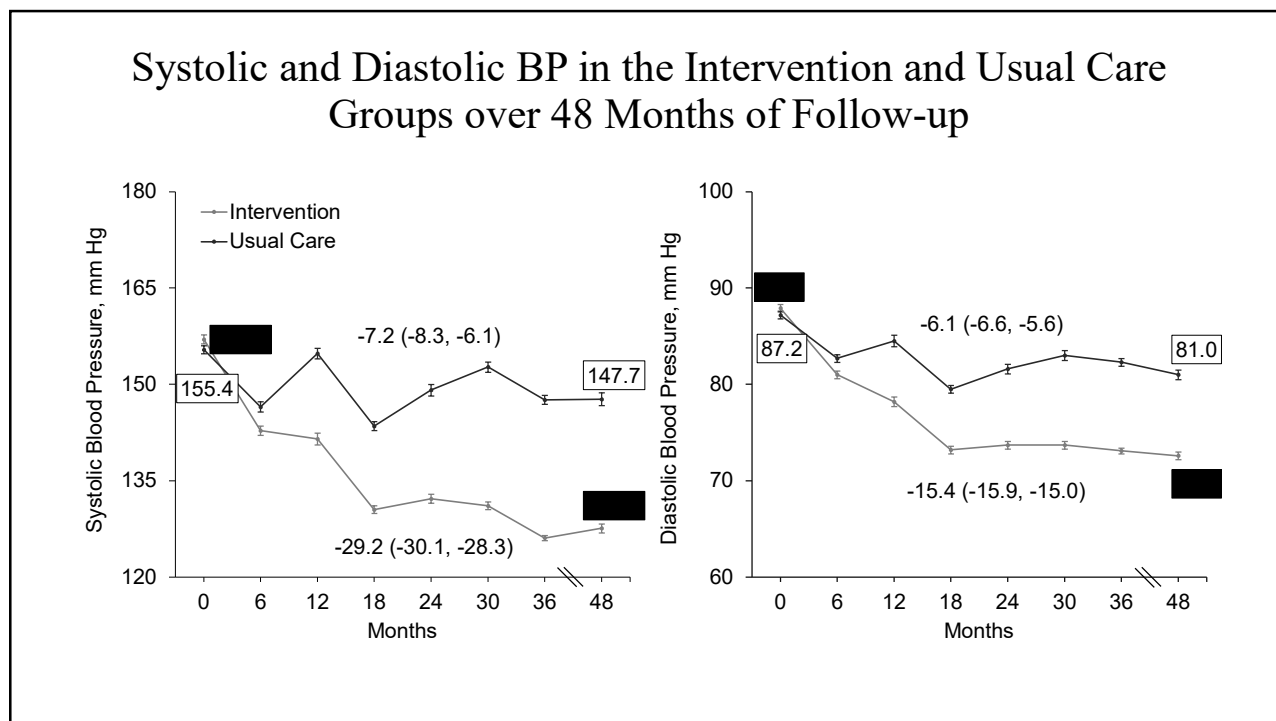
- Intention-to-treat analyses were conducted.
- Poisson regression with a robust error variance was used to calculate the relative risk and 95% CI of dementia and secondary outcomes associated with intervention, stratified by village, town, county, and province.
- In a secondary analysis, we adjusted for age, sex, education, cigarette smoking, history of major cardiovascular disease, use of antihypertensive medication, body mass index, systolic blood pressure, low-density lipoprotein cholesterol, and fasting plasma glucose at baseline.
- We also conducted predefined subgroup analyses by age, sex, education, smoking, BMI, SBP, and fasting plasma glucose at baseline.

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Baseline Characteristics of Study Participants

Characteristics	Intervention (n=17,407)	Control (n=16,588)
Age, years, mean (SD)	62.8 (9.3)	63.3 (9.2)
Female sex, no. (%)	10,603 (60.8)	10,222 (61.6)
Less than primary school, no. (%)	3,617 (21.6)	3,848 (23.8)
Current smoking, no. (%)	3,690 (21.4)	3,609 (22.0)
Use of antihypertensive medications, no. (%)	10,574 (60.4)	8,990 (54.3)
Body mass index, kg/m ² , mean (SD)	26.0 (3.9)	25.8 (3.9)
Systolic blood pressure, mmHg, mean (SD)	157.0 (18.0)	155.4 (17.4)
Low-density lipoprotein cholesterol, mg/dL, mean (SD)	105.4 (31.8)	104.7 (31.6)
Plasma glucose, mg/dL, mean (SD)	111.3 (37.0)	110.9 (35.7)
10-yr risk for atherosclerotic CVD, %, mean (SD)	14.7 (11.9)	14.5 (11.6)

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Blood Pressure Control and Use of Antihypertensive Medications at 48 Months of Follow-up

	Mean or proportion (95% CI)		Net difference (95% CI)	p value
	Intervention	Usual care		
Proportion of patients with BP <130/80 mm Hg, %	67.7 (65.8, 69.6)	15.0 (13.7, 16.4)	52.7 (50.4, 55.0)	<0.0001
Mean antihypertensive medications, number/patient	3.0 (3.0, 3.1)	1.2 (1.1, 1.2)	1.9 (1.8, 1.9)	<0.0001
Use of angiotensin-converting-enzyme inhibitors, %	50.3 (47.4, 53.2)	6.3 (5.5, 7.0)	44.0 (41.0, 47.1)	<0.0001
Use of angiotensin II receptor blockers, %	30.1 (27.5, 32.7)	32.3 (30.3, 34.4)	-2.2 (-5.5, 1.1)	0.19
Use of calcium channel blockers, %	86.8 (85.8, 87.9)	53.3 (51.1, 55.4)	33.6 (31.2, 36.0)	<0.0001
Use of diuretics, %	63.8 (61.7, 65.9)	10.8 (9.6, 12.1)	53.0 (50.5, 55.4)	<0.0001
High adherence to antihypertensive medication, %	88.0 (86.8, 89.2)	66.4 (64.3, 68.6)	21.6 (19.1, 24.0)	<0.0001

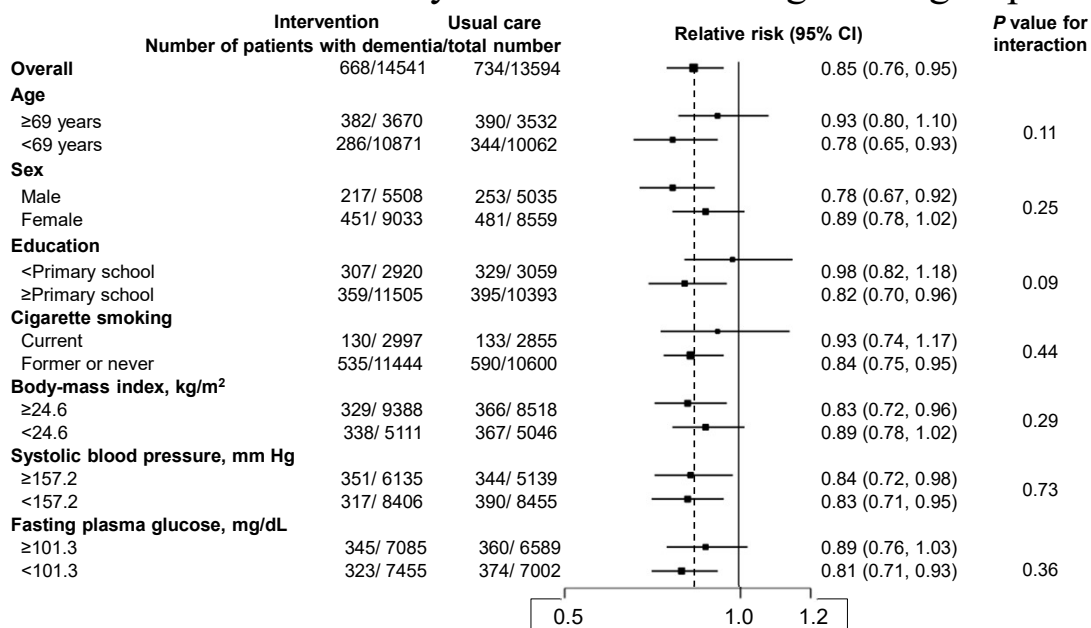
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Effectiveness of Blood Pressure Lowering on Primary, Secondary, and Safety Outcomes

Study outcomes	Intervention		Usual care		Relative risk (95% CI)	p value
	No. of events	Rate per year, %	No. of events	Rate per year, %		
Primary outcome (all cause dementia)	668	1.12	734	1.31	0.85 (0.76, 0.95)	0.0035
Cognitive impairment no dementia	2506	4.19	2808	5.02	0.84 (0.80, 0.87)	<0.0001
Dementia or cognitive impairment	3174	5.31	3542	6.34	0.84 (0.81, 0.87)	<0.0001
Dementia or deaths	1908	3.04	2092	3.54	0.86 (0.81, 0.92)	<0.0001
Serious adverse event	6201	9.16	6329	9.86	0.94 (0.91, 0.98)	0.0006
Injurious falls resulted in seeking medical care	166	0.25	157	0.24	1.01 (0.80, 1.28)	0.92
Syncopal events resulted in seeking medical care	127	0.19%	102	0.16%	1.20 (0.87, 1.66)	0.27

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Forest Plot of Primary Outcome According to Subgroups



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Summary

- Over 48 months of follow-up, the net group differences in systolic and diastolic BP reduction were 22.0 and 9.3 mmHg ($p < 0.0001$), respectively.
- The primary outcome of all-cause dementia was significantly reduced by 15% in the intervention group compared to usual care. The secondary outcome of cognitive impairment no dementia was also significantly reduced by 16% in the intervention compared to usual care.
- The effectiveness of BP reduction on all-cause dementia was consistent by subgroups of age, sex, education, cigarette smoking, body mass index, systolic blood pressure, and fasting plasma glucose at baseline.

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Conclusion

- Blood pressure reduction is effective in reducing the risk of dementia in patients with hypertension.
- This proven-effective intervention should be widely scaled up to reduce the global burden of dementia.

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THANK YOU



**Chulalongkorn
Stroke Center**
King Chulalongkorn Memorial Hospital