Health system strengthening and hypertension awareness, treatment and control: data from the China Health and Retirement Longitudinal Study

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Objective To monitor hypertension prevalence, awareness, treatment and control in China two to three years after major reform of the health system.

Methods Data from a national survey conducted in 2011–2012 among Chinese people aged 45 years or older – which included detailed anthropometric measurements – were used to estimate the prevalence of hypertension and the percentages of hypertensive individuals who were unaware of, receiving no treatment for, and/or not controlling their hypertension well. Modified Poisson regressions were used to estimate relative risks (RRs).

Findings At the time of the survey, nearly 40% of Chinese people aged 45 years or older had a hypertensive disorder. Of the individuals with hypertension, more than 40% were unaware of their condition, about 50% were receiving no medication for it and about 80% were not controlling it well. Compared with the other hypertensive individuals, those who were members of insurance schemes that covered the costs of outpatient care were more likely to be aware of their hypertension (adjusted RR, aRR: 0.737; 95% confidence interval, CI: 0.619–0.878) to be receiving treatment for it (aRR: 0.795; 95% CI: 0.680–0.929) and to be controlling it effectively (aRR: 0.903; 95% CI: 0.817–0.996).

Conclusion In China many cases of hypertension are going undetected and untreated, even though the health system appears to deliver effective care to individuals who are aware of their hypertension. A reduction in the costs of outpatient care to patients would probably improve the management of hypertension in China.

Abstracts in عربي, 中文, Français, Русский and Español at the end of each article.

Introduction

Cardiovascular and other noncommunicable diseases are currently responsible for two thirds of global mortality.[1,2] Universal health coverage may allow great improvements in the control of such diseases[3,4] but the best way to achieve such coverage, especially in low- and middle-income countries, remains unclear.[5]

Hypertension is a consistent and independent risk factor for cardiovascular and kidney diseases and stroke.[6] It is also very common, its global prevalence being about 40%.[2] Hypertension, which plays a part in approximately 55% of the global mortality caused by cardiovascular diseases and in 7% of all disability-adjusted life years,[7] could be managed at fairly low cost, even in resource-poor settings.[8–10] In the developed world, more than 80% of people with hypertension are aware of their condition and receiving treatment.[11–13] However, the health systems in most developing countries fail to detect and manage hypertension effectively.[14,15]

In China, the overall prevalence of hypertension rose substantially between 2002 and 2010 – from around 20% to 34%.[16–18] Unfortunately, the management of hypertension in China has been ineffective for many years. In 2010, for example, only 35.7% of hypertensive individuals were aware of their condition and fewer than 18% of such individuals were effectively controlling their hypertension.[17–19] It has been estimated that hypertension was associated with 20% of the deaths recorded in China in 2005, including 2.33 million – nearly 80% – of the deaths from cardiovascular disease.[20] Hypertension not only causes premature death; it may also

add to household costs. In a study conducted in rural China, for example, it was estimated that 4.1% of households suffered impoverishment as a result of hypertension.[21]

The prevention and control of noncommunicable diseases have been on China's policy agenda for decades.[22] In 2009, however, there was a huge reform of the national health system. The main aim of this reform was to attain universal coverage with affordable and equitable basic health care.[23,24] Three of the five pillars of the reform – a national programme of primary health care, a national essential medicine system and universal health insurance – are directly linked to the management of noncommunicable diseases.

Each year, the national programme of primary health care now spends 25 yuan per capita – or about 6.3 billion United States dollars in total – on community health-care providers. These providers work in urban community health-care centres or rural township hospitals and deliver a defined package of health care that includes the management of noncommunicable diseases.[23–25] The centres for community health care are responsible for establishing a health record and providing free health examinations – that include the measurement of blood pressure – for every person living in their catchment areas. The centres also provide advice on anti-hypertensive medication and hypertension control whenever appropriate. They should have access to more than 400 essential medicines, including various anti-hypertensive drugs such as beta blockers and calcium channel blockers. Provision of these medicines is heavily subsidized by the Chinese government on a non-profit basis.[26] Development of the two national programmes (primary health care and essentials medicine system) was expected
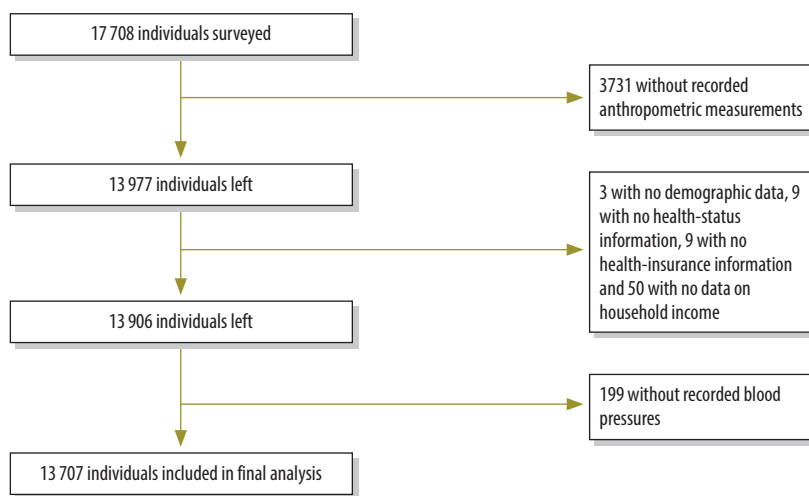
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Fig. 1. **Flowchart showing the selection of the subjects who were included in the final analysis in study of hypertension prevalence and control in China, 2011–2012**

<!-- Flowchart content -->
17 708 individuals surveyed

→ 3731 without recorded anthropometric measurements

13 977 individuals left

→ 3 with no demographic data, 9 with no health-status information, 9 with no health-insurance information and 50 with no data on household income

13 906 individuals left

→ 199 without recorded blood pressures

13 707 individuals included in final analysis

to lead to substantial improvements in the detection, treatment and control of hypertension.

Universal health insurance coverage was another goal of the health system reform launched in 2009. The achievement of this goal is slightly hampered by the number of health insurance schemes that exist in China and by the variation in the type and extent of the coverage offered by these schemes. In urban China, the Employee Basic Medical Insurance Scheme covers some of the employed. Some government employees are – or were – covered by the Government Insurance Scheme, while some other urban dwellers are covered by the Urban Resident Basic Medical Insurance Scheme. In rural areas, a New Cooperative Medical Scheme has been developed. Although health insurance has already become almost universal in China,[24,25] most of the population relies either on the Urban Resident Basic Medical Insurance Scheme or the New Cooperative Medical Scheme. These schemes focus on inpatient expenses and offer almost no reimbursement for outpatient costs.[25] Individuals who have to pay for outpatient care from their own pockets may be reluctant to seek medical care or advice and may never be checked for hypertension or other noncommunicable disorders until they are very ill and facing catastrophic expenditure.[27–29]

We investigated the prevalence, awareness, treatment and control of hypertension in China by using data from a national survey that was conducted in 2011–2012. The results indicate that

changes in health financing and insurance may improve the detection and management of hypertension in China.

Methods

We used data collected in the China Health and Retirement Longitudinal Study (CHARLS) of Chinese people aged 45 years or older.[30,31] The data were collected in a survey in which four-stage, stratified, cluster sampling was used to select eligible individuals. In the first stage, 150 county-level units from 28 provinces were selected to give a mix of urban and rural settings and a wide variation in the level of economic development. Three primary sampling units – administrative villages (*cun*) in rural areas and neighbourhoods (*shequ*) in urban areas – were then chosen in each selected county-level unit. All of the dwellings in each selected primary sampling unit were then outlined on Google Earth maps using the "CHARLS-GIS" software package that was specifically designed for the survey. Finally, for the present investigation, 24 of the mapped households in each primary sampling unit were randomly selected. If a selected household had more than one member aged 45 years or older, one such member – randomly chosen – and his or her spouse if also aged 45 years or older were selected as subjects of the survey. Overall, 17 708 individuals were investigated.[30]

A structured questionnaire with several main sections was used to collect data from each subject. One section

was used to record height, weight and blood pressure. Each subject's systolic and diastolic blood pressures were recorded three times by a trained nurse using an HEM-7112 electronic monitor (Omron, Kyoto, Japan). The mean values for each subject were then calculated but only given to the subjects once the interviews had ended. The interviewees were asked if they had hypertension and whether they were taking any form of anti-hypertensive medication, including Chinese traditional medicines. A subject was considered hypertensive if he or she had a mean systolic blood pressure of ≥ 140 mmHg, a mean diastolic blood pressure of ≥ 90 mmHg and/or was already taking anti-hypertensive medication.[2] A systolic blood pressure of ≥ 160 mmHg or a diastolic blood pressure of ≥ 100 mmHg was considered indicative of stage 2 hypertension, while corresponding values of ≥ 180 and ≥ 110 mmHg were considered indicative of stage 3.[32] Hypertensive persons who had previously received a doctor's diagnosis of hypertension or simply claimed to be hypertensive were considered to be aware of their hypertension. Hypertensive persons who claimed to be receiving any form of anti-hypertensive medication were considered to have treated hypertension. Hypertensive persons whose systolic blood pressure was < 140 mmHg or whose diastolic blood pressure was < 90 mmHg – or both – were considered to be controlling their hypertension well.[14]

Subjects were asked if they belonged to a health-insurance scheme and, if so, to identify the scheme. The schemes were separated into those providing the costs of outpatient care – the Employee Basic Medical Insurance Scheme and the Government Insurance Scheme – and those that contributed nothing or almost nothing to the costs of outpatient care – the Urban Resident Basic Medical Insurance Scheme or the New Cooperative Medical Scheme. All of the respondents with anthropometric measurements had health insurance.

One section of the questionnaire investigated the socioeconomic status of each subject and his or her modifiable indicators of hypertension risk. The socioeconomic factors investigated were setting, geographical region, sex, age, marital status, level of education and household income. Each subject was classified as a long-term urban resident, a long-term rural resident

Table 1. **Demographic and socioeconomic characteristics of surveyed subjects, China, 2011–2012**

Characteristic	All subjects			Urban subjects			Rural subjects		
	No.	% unweighted	% weighted	No.	% unweighted	% weighted	No.	% unweighted	% weighted
Region									
Eastern	5 143	37.5	43.0	1 908	37.7	46.7	3 235	37.5	39.4
Central	5 157	37.6	34.3	2 092	41.3	35.3	3 065	35.5	33.4
Western	3 407	24.9	22.7	1 068	21.1	18.1	2 339	27.1	27.2
Setting									
Long-term urban	5 068	37.0	49.1	5 068	100.0	100.0	–	–	–
Urban migrant from rural area	5 822	42.5	33.0	–	–	–	5 822	67.4	64.9
Long-term rural	2 817	20.6	17.9	–	–	–	2 817	32.6	35.1
Sex									
Female	7 300	53.3	52.8	2 769	54.6	54.2	4 531	52.5	51.4
Male	6 397	46.7	47.1	2 295	45.3	45.7	4 102	47.5	48.5
Age (years)									
< 50	2 593	18.9	20.8	1 009	19.9	22.1	1 584	18.3	19.5
50–59	4 661	34.0	33.8	1 698	33.5	33.7	2 963	34.3	33.8
60–69	4 056	29.6	26.7	1 454	28.7	25.7	2 602	30.1	27.7
70–79	1 905	13.9	14.3	737	14.5	14.5	1 168	13.5	14.2
≥ 80	491	3.6	4.4	170	3.4	4.0	321	3.7	4.8
Marital status									
Married or cohabiting	11 940	87.1	85.7	4 422	87.3	86.4	7 518	87.0	85.1
Single	1 767	12.9	14.3	646	12.8	13.6	1 121	13.0	14.9
Education									
Illiterate	3 908	28.5	25.8	940	18.6	17.1	2 968	34.4	34.2
Primary	5 583	40.7	38.6	1 921	37.9	35.1	3 662	42.4	42.0
Secondary	3 981	29.0	33.0	1 998	39.4	42.9	1 983	23.0	23.5
College and above	235	1.7	2.6	209	4.1	4.9	26	0.3	0.3
Household income (quintile)[a]									
5	2 765	20.2	17.8	760	15.0	12.1	2 005	23.2	23.3
4	2 722	19.9	16.8	661	13.0	10.3	2 061	23.9	23.2
3	2 740	20.0	18.2	846	16.7	14.9	1 894	21.9	21.4
2	2 772	20.2	22.1	1 170	23.1	25.7	1 602	18.5	18.6
1	2 708	19.8	25.1	1 631	32.2	37.1	1 077	12.5	13.6
Outpatient care covered by insurance?									
No	12 309	89.8	83.6	3 863	76.2	69.1	8 446	91.8	97.6
Yes	1 398	10.2	16.4	1 205	23.8	30.9	193	2.2	2.4

[a] 5 is the richest; 1 is the poorest.

or a rural resident who had moved into an urban area. Level of education was categorized as illiterate, primary education only, secondary education but no higher, or educated to at least college level. Household income was split into five quintiles. The modifiable risk factors that we considered were body mass index, how often the subject drank alcohol in a month, whether the subject smoked tobacco every day, the subject's level of exercise, the number of times in the previous year that the subject's blood pressure had been mea-

sured, and whether the subject had had a health examination in the previous two years. A subject was categorized as "active" if he or she engaged in 30 minutes of moderate activity at least five times per week or in 20 minutes of vigorous activity at least three times per week. Those who engaged in < 10 minutes of continuous exercise each week were categorized as "sedentary". All other subjects were considered to be "less active".[2]

In the results, we report both weighted and unweighted proportions. The

weights take account of the national representativeness of the results and the missing anthropometric measurements.[31] Multilevel Poisson regression was used – with allowance for the sample stratification and clustering at village and household level – to determine – for various groups – the crude and adjusted relative risks (RRs) for lack of awareness of hypertension in a hypertensive individual, lack of anti-hypertensive treatment of a hypertensive individual and failure of a hypertensive individual to control his or her hypertension well. Poisson regression

Research
Hypertension management in China
Xing Lin Feng et al.

Table 2. **Management of hypertension and modifiable risk factor prevalence, China, 2011–2012**

Characteristic/factor	All subjects			Urban subjects			Rural subjects[a]		
	No.	% unweighted	% weighted	No.	% unweighted	% weighted	No.	% unweighted	% weighted
Hypertension									
All forms	5 295	38.6	40.9	2 166	42.7	44.8	3 129	36.2	37.1
Stage 1	3 739	27.3	29.0	1 552	30.6	32.3	2 187	25.3	25.8
Stage 2	1 027	7.5	7.8	407	8.0	8.3	620	7.2	7.3
Stage 3	529	3.9	4.1	207	4.1	4.2	322	3.7	4.0
Unaware of hypertension[b]	2 257	42.6	43.8	848	39.2	42.7	1 409	45.0	45.0
Not receiving anti-hypertensive medication[b]	2 700	51.0	51.5	1 019	47.1	49.9	1 681	53.7	53.4
Hypertension not well controlled[b]	4 226	79.8	80.8	1 690	78.0	80.9	2 536	81.1	80.7
Body mass index (kg/m²)									
< 18.5	933	6.8	6.4	229	4.5	4.4	704	8.2	8.2
≥ 18.5 but < 25	8 384	61.2	59.1	2 862	56.5	53.8	4 786	63.9	64.1
≥ 25 but < 30 (overweight)	3 480	25.4	26.5	1 545	30.5	31.1	2 215	22.4	22.0
≥ 30 (obese)	665	4.9	6.1	341	6.7	8.7	780	3.8	3.6
Alcohol consumption[c]									
> 1	3 342	24.4	24.2	1 157	22.8	23.2	2 185	25.3	25.3
> 0 but ≤ 1	1 076	7.9	9.0	422	8.3	10.3	654	7.6	7.7
0	9 288	67.8	66.8	3 488	68.8	66.5	5 800	67.1	67.0
Daily smoking?									
No	10 697	78.0	78.4	3 955	78.0	78.9	6 742	78.0	78.0
Yes	3 010	22.0	21.6	1 113	22.0	21.1	1 897	22.0	22.0
Exercise									
Active[d]	4 023	29.4	27.1	1 300	25.7	22.8	2 723	31.5	31.3
Less active[e]	1 136	8.3	9.9	614	12.1	13.6	522	6.0	6.3
Sedentary[f]	8 548	62.4	63.0	3 154	62.2	63.7	5 394	62.4	62.4
Blood-pressure monitoring (times in previous year)									
0	10 958	79.9	79.6	3 944	77.8	78.3	7 014	81.2	80.9
< 4	1 011	7.4	7.0	339	6.7	6.3	672	7.8	7.6
≥ 4	1 738	12.7	13.4	785	15.5	15.5	953	11.0	11.4
Health examination in previous 2 years?									
No	7 532	55.0	54.9	2 597	51.2	52.3	4 935	57.1	57.5
Yes	6 175	45.1	45.1	2 471	48.8	47.7	3 704	42.9	42.5

[a] Since – for the main outcomes – the proportions of the long-term rural residents were similar to the corresponding values for those who had migrated from rural areas to urban settings, the results for both of these groups were combined in this table under "rural subjects".

[b] In the calculation of the percentages shown for this characteristic, the denominator was the number of hypertensive subjects and not – as elsewhere in the table – the number of interviewees.

[c] Drinking episodes per month.

[d] A subject was categorized as "active" if he or she engaged in 30 minutes of moderate activity at least five times per week or in 20 minutes of vigorous activity at least three times per week.

[e] A subject was categorized as "less active" if he or she was neither active nor sedentary.

[f] A subject was categorized as "sedentary" if he or she engaged in < 10 minutes of continuous exercise per week.

was used because we wanted to compute RRs rather than odds ratios.[33] Potential explanatory variables were added individually to determine their effects on the magnitudes of the RRs.

Results

Although 17 708 individuals were surveyed, full data were only available for 13 707 of them (Fig. 1). The proportion of subjects with any missing observations appeared unaffected by age, sex, level of education, setting, household income or marital status.[31] Although 22.7% of the interviewees who reported

Xing Lin Feng et al.

hypertension had missing information, the corresponding value for those not reporting hypertension – 20.8% – was similar.

Table 1 summarizes the background characteristics of the 13 707 subjects who were included in the final analysis. The weighted proportions were similar to the unweighted values. Most of the subjects lived in urban areas and were literate. Most belonged to health insurance schemes that did not cover the costs of outpatient care.

Of the 13 707 individuals whose data were analysed, 5295 (38.6%) were found to have hypertension, although the more severe forms of hypertension – stages 2 and 3 – were relatively rare (Table 2). More than 40% of the individuals found to have hypertension were unaware that they were hypertensive, more than half were not receiving any form of anti-hypertensive medication and < 20% were controlling their hypertension well (Table 2). The prevalence of hypertension was higher among urban than among rural residents – with weighted values of 44.8% and 37.1%, respectively – but, compared with their urban counterparts, rural hypertensive subjects were slightly less likely to be aware of their hypertension and to be on medication. There were no differences between urban and rural subjects in terms of hypertension control (Table 2).

Many of the subjects were overweight (weighted percentage: 26.5%) or obese (6.1%) and more than one in every five of them drank alcohol at least twice per month or smoked every day (Table 2). Most of the subjects lived sedentary lives, most had not had their blood pressure measured in the previous year, and most had not had a health examination in the previous 2 years (Table 2). In terms of the prevalences of these modifiable risk factors, the surveyed subjects in urban areas were similar to those in rural areas (Table 2).

When the subjects were divided into five age groups – < 50, 50–59, 60–69, 70–79 and ≥ 80 years – the prevalence of hypertension in every age group was found to be slightly higher among the members of health insurance schemes that covered the costs of outpatient care than among the members of other health insurance schemes (Fig. 2). However, the three aspects of the management of hypertension that we investigated – awareness, treatment and effective control – were also more common

among the members of health insurance schemes that covered the costs of outpatient care (Fig. 3).

In terms of the awareness (Table 3) and treatment (Table 4) of hypertension, the differences seen between urban residents and rural residents were smaller than – and could be fully explained by – those seen between the two types of insurance coverage. After adjusting for sex, age, marital status, level of education and household income, the hypertensive members of health insurance schemes that covered the costs of outpatient care appeared to be more likely to be aware of their disorder (RR: 1.357; 95% confidence interval, CI: 1.139–1.616) and more likely to be receiving anti-hypertensive treatment (RR: 1.258; 95% CI: 1.010–1.471) than the other hypertensive subjects.

Compared with their female counterparts, hypertensive males were significantly less likely to be aware of their hypertension (Table 3) and to be receiving anti-hypertensive treatment (Table 4). Marital status and household income did not appear to have a significant independent effect on the management of hypertension. However, compared with their literate counterparts, the hypertensive subjects who were illiterate were significantly less likely to be aware of their hypotension (Table 3) and to be receiving anti-hypertensive treatment (Table 4).

Factors associated with the effective control of hypertension are shown

in Table 5. Again, the differences seen between urban residents and rural residents could be fully explained by the type of insurance coverage. After adjusting for demographic factors, the RR for the effective control of hypertension among the members of insurance schemes that did not cover outpatient care – compared with the risk among members of other schemes – was 0.869 (95% CI: 0.783–0.965). Further adjustment – to include all of the modifiable risk factors – changed this RR again, to 0.903 (95% CI: 0.817–0.996). The significant association of the type of insurance scheme with hypertension management persisted after adjusting for all other potential differentials. Obesity appears to be the only other investigated factor that had a statistically significant association with the effective control of hypertension (Table 5).

Discussion

Using data collected in 2011–2012 from the CHARLS national survey, we found that nearly 40% of the inhabitants of China who are aged 45 years or older have some form of hypertensive disorder. Of the interviewees who were found to have hypertension at the time of the interview, more than 40% were unaware of their hypertension and about a half were not receiving any anti-hypertensive medication – irrespective of where they lived or their socioeconomic status. Although high prevalences and poor
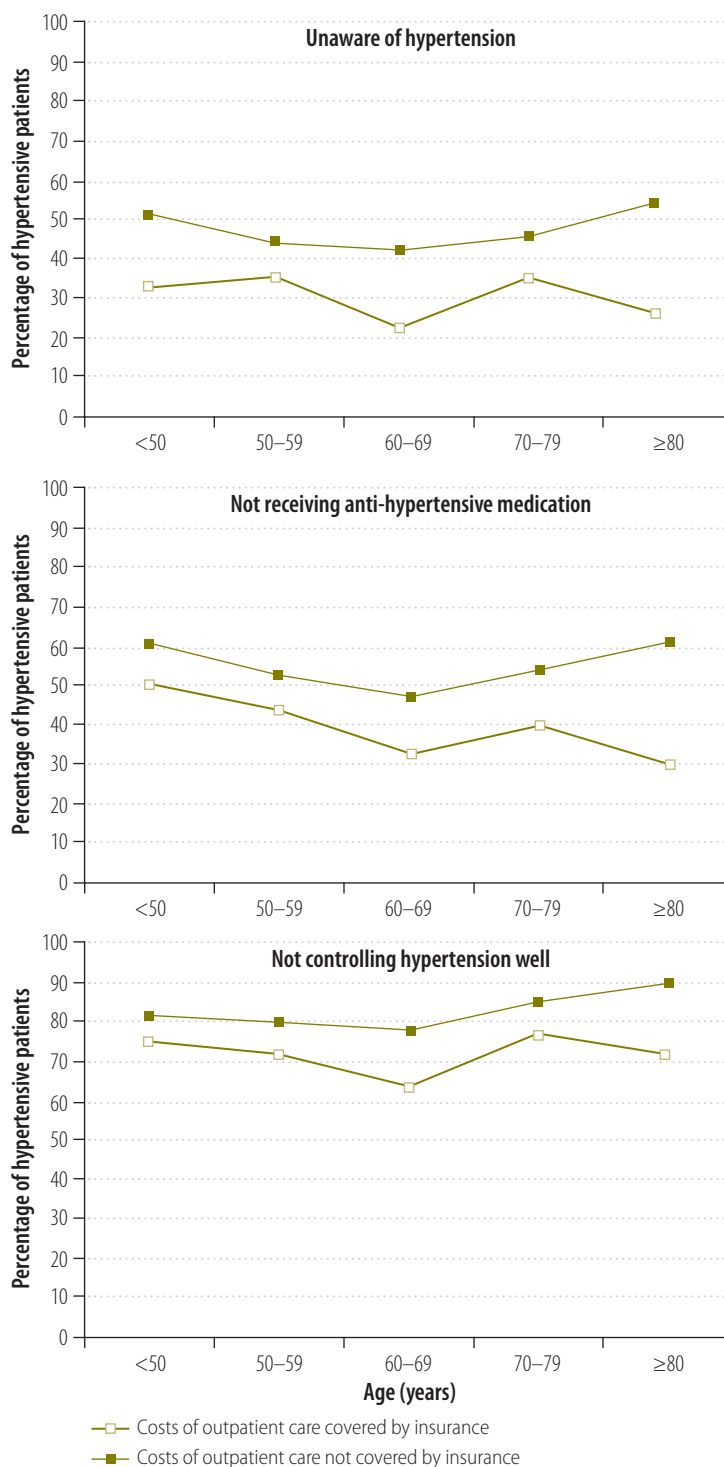
Fig. 2. **Prevalence of hypertension, by age group and type of health insurance, China, 2011–2012**
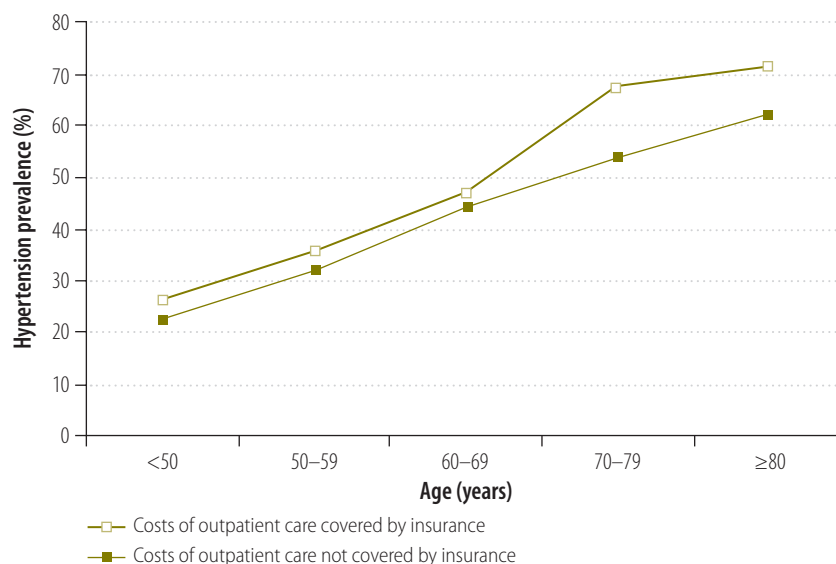
management of hypertension have been reported in China on several occasions,[15–19,34–37] it is disappointing to observe these problems two to three years after substantial reforms to the health system. The management of hypertension in China appears no better than that in other developing countries[14,15] and the effective control of hypertension appeared to be as rare in China in 2011–2012 as it was a decade earlier.[17,19] Given that hypertension can be prevented and controlled at low cost,[8–10] there is no good reason why hypertension in China cannot be managed as well as hypertension in other, more developed countries. In Europe, Japan and North America, for example, more than 80% of hypertensive individuals are aware of their hypertension, more than 80% are receiving anti-hypertensive treatment and more than 60% are controlling their hypertension well.[11–13] If the same proportions could be achieved in China, annual mortality among people aged 45 years or older would be reduced by an estimated 860 000 deaths – equivalent to 24 times the annual number of deaths among children younger than 5 years or 130 times the corresponding value for maternal mortality.[38,39]

Some of our data are encouraging. For example, the proportion of hypertensive individuals who were aware of their hypertension was never found to be more than 9% higher than the corresponding proportion of hypertensive individuals who were receiving anti-hypertensive medication. In other words, almost all individuals in China who know they are hypertensive have access to appropriate treatment. Furthermore, the hypertension in many of the individuals who are receiving anti-hypertensive medication appears be under effective control. As primary health care becomes increasingly available and affordable in China,[24,26] access to effective treatment and control of hypertension continues to improve – and the effective management of hypertension largely becomes a case identification problem. Too many inhabitants of China are unaware that they have hypertension, perhaps because most asymptomatic individuals believe they are healthy and see no benefit in routine health checks. In the CHARLS survey conducted two to three years after a health reform that was designed to establish a heath record and regular health checks for every inhabitant of China, it was very disappointing to

see how few of our interviewees had had their blood pressures determined in the previous year. There are several reasons why many cases of hypertension are going undetected in China. The services provided by community health care in the country – which is based on the Soviet Semashko model[40] – are often as specialized as those available

in general hospitals. However, there are more physicians than nurses available for community health care, and many of the physicians spend most of their working days sitting in their offices, waiting for patients.[41] Some of the professionals are unwilling or insufficiently skilled to engage in general practice and preventive care. As a result of these problems

Fig. 3. **Awareness, treatment and control of hypertension, by age group and type of health insurance, 2011–2012**

Table 3. **Factors affecting the probability that a hypertensive individual will be unaware of having hypertension, China, 2011–2012**

Factor	No. of hypertensive subjects	Percentage unaware	Crude RR (95% CI)	RR (95% CI) adjusted for		
				insurance type and setting	insurance type, setting, sex and age	all factors[a]
Outpatient care covered by insurance?						
No	2064	44.35	1	1	1	1
Yes	193	30.11	0.679 (0.586–0.787)	0.704 (0.602–0.822)	0.684 (0.585–0.800)	0.737 (0.619–0.878)
Setting						
Rural	1409	45.03	1	1	1	1
Urban	848	39.15	0.869 (0.798–0.947)	0.936 (0.855–1.024)	0.942 (0.861–1.030)	0.975 (0.889–1.069)
Sex						
Female	1169	40.32	1	–	1	1
Male	1086	45.40	1.126 (1.037–1.223)	–	1.160 (1.067–1.261)	1.222 (1.116–1.339)
Marital status						
Married or cohabiting	1813	41.53	1	–	–	1
Single	444	47.79	1.151 (1.037–1.277)	–	–	1.129 (1.008–1.264)
Education						
Illiterate	789	46.38	1	–	–	1
Primary	891	41.52	0.895 (0.813–0.985)	–	–	0.878 (0.790–0.976)
Secondary	542	40.21	0.867 (0.777–0.967)	–	–	0.871 (0.762–0.995)
College and above	35	35.00	0.755 (0.538–1.059)	–	–	0.898 (0.622–1.295)
Household income (quintile)[b]						
5	396	37.04	0.825 (0.725–0.940)	–	–	0.984 (0.853–1.136)
4	403	39.74	0.885 (0.778–1.007)	–	–	0.942 (0.823–1.076)
3	437	43.70	0.974 (0.858–1.104)	–	–	1.003 (0.882–1.140)
2	481	47.67	1.062 (0.939–1.201)	–	–	1.055 (0.932–1.194)
1	540	44.89	1	–	–	1

[a] Insurance type, setting, sex, age, region, marital status, level of education and household income.
[b] 5 is the richest; 1 is the poorest.

Table 4. Factors affecting the probability that a hypertensive individual will not be receiving anti-hypertensive medication, China, 2011–2012

Factor	No. of hypertensive subjects	Percentage not receiving medication	Crude RR (95% CI)	RR (95% CI) adjusted for		
				insurance type and setting	insurance type, setting, sex and age	all factors[a]
Outpatient care covered by insurance?						
No	2455	52.75	1	1	1	1
Yes	245	38.22	0.725 (0.635–0.826)	0.754 (0.656–0.866)	0.737 (0.640–0.847)	0.795 (0.680–0.929)
Setting						
Rural	168	53.72	1	1	1	1
Urban	1019	47.05	0.876 (0.810–0.947)	0.931 (0.857–1.010)	0.936 (0.862–1.016)	0.966 (0.888–1.051)
Sex						
Female	1399	48.26	1	–	1	1
Male	1298	54.26	1.125 (1.043–1.213)	–	1.154 (1.069–1.245)	1.213 (1.116–1.318)
Marital status						
Married or cohabiting	2187	50.09	1	–	–	1
Single	513	55.22	1.102 (1.001–1.214)	–	–	1.099 (0.990–1.221)
Education						
Illiterate	930	54.67	1	–	–	1
Primary	1074	50.05	0.915 (0.838–0.999)	–	–	0.888 (0.806–0.978)
Secondary	654	48.52	0.887 (0.803–0.981)	–	–	0.862 (0.763–0.974)
College and above	42	42.00	0.768 (0.564–1.047)	–	–	0.855 (0.612–1.194)
Household income (quintile)[b]						
5	483	45.18	0.866 (0.769–0.975)	–	–	1.009 (0.885–1.151)
4	490	48.32	0.926 (0.823–1.042)	–	–	0.971 (0.859–1.097)
3	518	51.80	0.992 (0.883–1.115)	–	–	1.013 (0.900–1.140)
2	581	57.58	1.103 (0.985–1.235)	–	–	1.092 (0.975–1.224)
1	628	52.20	1	–	–	1

CI, confidence interval; RR, relative risk.
a Insurance type, setting, sex, age, region, marital status, level of education and household income.
b 5 is the richest; 1 is the poorest.

Table 5. Factors affecting the probability that a hypertensive individual will not have the hypertension under effective control, China, 2011–2012

Factor	No. of hypertensive subjects	Percentage without effective control	Crude RR (95% CI)	RR (95% CI) adjusted for				
				insurance type and setting	insurance type, setting, sex and age	insurance type, setting, sex, age, marital status, education and household income	insurance type, setting, sex, age, marital status, education, household income and MRF[a]	insurance type and treatment
Outpatient care covered by insurance?								
No	3771	81.03	1	1	1	1	1	1
Yes	455	70.98	0.876 (0.795–0.966)	0.880 (0.794–0.976)	0.869 (0.783–0.965)	0.900 (0.815–0.992)	0.903 (0.817–0.996)	0.946 (0.858–1.043)
Hypertension being treated?								
Yes	1526	58.81	1	–	–	–	–	1
No	2700	100.00	1.701 (1.597–1.811)	–	–	–	–	1.695 (1.591–1.805)
Setting								
Rural	1690	81.05	1	1	1	1	1	–
Urban	2536	78.02	0.963 (0.905–1.024)	0.991 (0.928–1.058)	0.994 (0.930–1.061)	1.004 (0.939–1.074)	1.011 (0.945–1.082)	–
Sex								
Female	2296	79.20	1	–	1	1	1	–
Male	1926	80.52	1.017 (0.957–1.080)	–	1.028 (0.967–1.093)	1.050 (0.983–1.122)	0.995 (0.918–1.078)	–
Marital status								
Married or cohabiting	3443	78.86	1	–	1	1	1	–
Single	783	84.28	1.069 (0.989–1.155)	–	1.037 (0.953–1.129)	1.023 (0.939–1.116)	–	–
Education								
Illiterate	1422	83.60	1	–	1	1	–	–
Primary	1699	79.17	0.947 (0.883–1.016)	–	0.955 (0.884–1.032)	0.954 (0.882–1.032)	–	–
Secondary	1038	77.00	0.921 (0.850–0.998)	–	0.942 (0.854–1.038)	0.942 (0.854–1.040)	–	–
College and above	67	67.00	0.802 (0.627–1.024)	–	0.859 (0.659–1.118)	0.875 (0.670–1.143)	–	–
Body mass index (kg/m²)								
<18.5	232	88.21	1.079 (0.942–1.235)	–	–	1.058 (0.923–1.212)	–	–
≥18.5 but <25	2272	81.79	–	–	–	1	–	–
≥25 but <30	1313	77.19	0.944 (0.882–1.010)	–	–	0.959 (0.894–1.027)	–	–
≥30	304	71.19	0.871 (0.772–0.981)	–	–	0.884 (0.783–0.999)	–	–

CI, confidence interval; MRF, modifiable risk factors; RR, relative risk.
[a] Alcohol consumption, body mass index, exercise and smoking.

in community health care, most of the people who live in China prefer to visit general hospitals for primary care[42] and many are, in consequence, never offered the free health checks that should be provided by the community health-care workers. In addition, the monitoring and supervision of community health-care workers are suboptimal. This may explain why about half of the health records that have been created by such workers are considered inadequate.[43]

Interestingly, we found that the type of health insurance – that is, whether or not the subject's health insurance covered the costs of outpatient care – was the strongest predictor of the effective management of hypertension in China. Hypertensive individuals with insurance that covered outpatient care were much more likely to be aware of their hypertension – and to be receiving anti-hypertensive medication – than the hypertensive members of other schemes. These associations were independent of setting, demographic factors and socioeconomic status. In large-scale trials, demand-side reimbursements have been found to increase willingness to access outpatient care – particularly the utilization of primary and preventive services.[44,45] Given the likely benefits in terms of the early detection of hypertension, the costs of outpatient care need to be included in all health insurance schemes in China. This should not only improve health outcomes but also provide financial risk protection[28,29] and improve the management of "catastrophic" chronic conditions in rural areas.[27] The current health system in China has been criticized for its fragmentation in providing preventive, primary and tertiary services, which has probably led to the inefficient use of the limited resources and the underuse of community health care.[46] However, a more cost-effective, integrated delivery of health services in China is unlikely to be seen before the development of robust and unified financial arrangements.[47]

Neither marital status nor household income was an independent predictor of the management of hypertension

in China but illiterate hypertensive individuals were less likely to be aware of their hypertension than their literate counterparts. Among those who were literate and hypertensive, however, level of education had no apparent impact on awareness. Socioeconomic status had no apparent impact on the effective control of hypertension. Taken together, these observations confirm that the main stumbling block in the effective management of hypertension in China is the identification of hypertensive individuals. Observations on the social determinants of health can help identify modifiable risk factors and guide risk reduction through either system-level multisectoral interventions or individual-level health promotion.[48,49] However, behavioural changes to reduce the risk of hypertension are unlikely to be achieved quickly. In addition, in our study, the impact of insurance benefits on the control of hypertension was found to be larger than that of any of the modifiable risk factors that we investigated.

Our data come from the CHARLS survey, which was national and considered to be nationally representative once adjustments had been made for the sampling system. Encouragingly, our estimates of the prevalence of hypertension and of membership in the various health insurance schemes tally with those made in other studies in China.[15,18,25,34,37] The close similarity between the weighted and unweighted proportions indicates that the sampling procedure used in the survey was good. It is unclear why hypertension prevalence was relatively high among members of health insurance schemes that covered the costs of outpatient care, although the memberships of the insurance scheme probably differ in certain demographic and lifestyle factors. The classification of four health insurance schemes into just two categories – those that generally covered the costs of outpatient care and those that did not – may have masked scheme-specific associations and within-scheme variations. For example, the Urban Resident Basic Medical Insurance Scheme and the New Cooperative Medical Scheme vary in

their benefit packages by region and occasionally cover the costs of outpatient care. However, these schemes only seem to pay for the outpatient care of individuals who have a "severe and catastrophic" noncommunicable disease, such as severe cardiovascular or cerebrovascular complications.[25,28,29] Although 20% of the CHARLS interviewees had missing anthropometric measurements – potentially leading to selection bias – these interviewees were fairly evenly distributed in terms of their background characteristics.[31] Furthermore, the weighted results – which took account of the missing values – were similar to the crude, unweighted results. As previously, we used Poisson regression to take account of the sampling design and compute robust estimates and RRs.[33]

Hypertension has become a pressing national problem in China and its control should be on the country's post-2015 development agenda.[50] Following the major health system reform of 2009, China seems to be performing well in delivering effective care to those who are aware of their hypertension. The main challenge that remains is how to identify and reach the many hypertensive individuals who are unaware of their hypertension, especially those who do not present for regular health check-ups or otherwise engage with the health system. Clearly, major changes need to be made to health service delivery in China. The scope of universal health-care coverage should go beyond financial risk protection and include more aspects of primary health care. With concerted efforts in integrating health finances and offering more generous outpatient service coverage, a stronger national health system – that could make huge and rapid improvements in the management of hypertension and other disorders – could be forged in China. ■

ملخص

تعزيز النظام الصحي والتوعية بفرط ضغط الدم، وعلاجه ومكافحته في الصين

تعزيز النظام الصحي والتوعية بفرط ضغط الدم، وعلاجه ومكافحته: بيانات من دراسة طولانية للصحة والتقاعد في الصين

الغرض رصد انتشار فرط ضغط الدم والتوعية به وعلاجه ومكافحته في الصين عقب سنتين إلى ثلاث سنوات من الإصلاح الرئيسي الذي شهده النظام الصحي.

الطريقة تم استخدام البيانات من مسح وطني أجري في الفترة من 2011 إلى 2012 بين الأشخاص الصينيين الذين تبلغ أعمارهم 45 عاماً فأكثر – والتي اشتملت على قياسات بشرية مفصلة –

لتقييم انتشار فرط ضغط الدم والنسب المئوية للأفراد المصابين بفرط ضغط الدم الذين لا يدركون إصابتهم بفرط ضغط الدم أو لا يتلقون علاجاً له و/ أو لا يكافحونه بشكل جيد. وتم استخدام ارتدادات بواسون المعدلة لتقييم الخطورة النسبية (RRs).

النتائج كانت نسبة 40 ٪ من الأشخاص الصينيين الذين تبلغ أعمارهم 45 عاماً فأكثر مصابة باضطراب فرط ضغط الدم وقت المسح. وكان أكثر من 40 ٪ من الأفراد المصابين بفرط ضغط الدم غير مدركين لحالتهم ولم يتلق حوالي 50 ٪ أي علاج له، ولم تكافحه بشكل جيد نسبة 80 ٪ تقريباً. ومقارنة بغيرهم من الأفراد المصابين بفرط ضغط الدم، يرجح إدراك الأفراد المشاركين في مخططات تأمين غطت تكاليف رعاية المرضى الخارجيين، إصابتهم

بفرط ضغط الدم (الخطورة النسبية المعدلة: 0.737؛ فاصل الثقة 95 ٪، فاصل الثقة: من 0.619 إلى 0.878) والذين يتلقون علاجاً له (الخطورة النسبية المعدلة: 0.795؛ فاصل الثقة 95 ٪، فاصل الثقة: من 0.680 إلى 0.929) والذين يكافحونه بفعالية (الخطورة النسبية المعدلة: 0.903؛ فاصل الثقة: من 0.817 إلى 0.996).

الاستنتاج لا يتم اكتشاف العديد من حالات فرط ضغط الدم أو علاجها في الصين، على الرغم مما يبدو من أن النظام الصحي يقدم رعاية فعالة للأفراد الذين يدركون إصابتهم بفرط ضغط الدم. ومن المحتمل أن يحسّن خفض تكاليف رعاية المرضى الخارجيين إلى المرضى من تدبير فرط ضغط الدم في الصين.

摘要

加强卫生系统和高血压知晓、治疗和控制：来自中国健康与养老追踪调查的数据

目的 监测中国在医疗卫生体制重大改革两到三年之后的高血压患病率、知晓率、治疗率和控制率。

方法 使用来自 2011-2012 年针对 45 岁或以上中国人的全国性调查的数据（包括详细的人体测量数据）来估计高血压的患病率以及不知道、没有接受治疗和 / 或没有很好控制其高血压病情的高血压患者百分比。使用修正泊松回归估计相对风险 (RR)。

结果 在调查中，近 40% 年龄在 45 岁或以上的中国人有高血压症。高血压患者中超过 40% 的人不知道其病情，约 50% 的患者没有接受药物治疗，大约 80%

患者的病情没有控制得很好。相比其他的高血压患者，门诊医疗费用由医保报销的参保人员则更有可能知晓到自己有高血压（调整 RR,aRR:0.737;95% 置信区间,CI:0.619 − 0.878）、接受治疗 (aRR:0.795;95% CI:0.680 − 0.929) 以及进行有效的控制 (aRR:0.903;95% CI:0.817 − 0.996)）。

结论 在中国，尽管卫生系统似乎对知晓到患有高血压的个人提供了有效的护理，但是很多高血压病例仍未得到发现和治疗。减少患者医疗门诊的成本可能会改善中国高血压的管理状况。

Résumé

Renforcement du système de santé et sensibilisation, traitement et contrôle de l'hypertension: données de l'étude longitudinale de la santé et de la retraite en Chine (CHARLS)

Objectif Surveiller la prévalence, la sensibilisation, le traitement et le contrôle de l'hypertension en Chine deux à trois ans après une réforme majeure du système de santé.

Méthodes Les données d'une enquête nationale menée en 2011-2012 auprès de Chinois âgés de 45 ans ou plus (qui comprenait des mesures anthropométriques détaillées) ont été utilisées pour estimer la prévalence de l'hypertension et les pourcentages de patients souffrant d'hypertension, qui ne connaissaient pas, ne recevaient pas de traitement et/ou ne surveillaient pas correctement leur hypertension. Des modèles de Poisson modifiés ont été utilisés pour estimer les risques relatifs (RR).

Résultats Au moment de l'enquête, près de 40% des individus chinois âgés de 45 ans ou plus présentaient un trouble de l'hypertension. Parmi les personnes souffrant d'hypertension, plus de 40% ignoraient leur

maladie, environ 50% ne recevaient aucun médicament pour la traiter et environ 80% ne la surveillaient pas correctement. En comparaison avec les autres individus souffrant d'hypertension, ceux qui étaient affiliés à des régimes d'assurance couvrant les coûts des soins ambulatoires étaient plus susceptibles d'être au courant de leur hypertension (RR ajusté, rra: 0,737; intervalle de confiance à 95%, IC: 0,619 à 0,878), à recevoir un traitement pour la traiter (rra: 0,795; IC à 95%: 0,680 à 0,929) et à la contrôler efficacement (rra: 0,903; IC à 95%: 0,817 à 0,996).

Conclusion En Chine, de nombreux cas d'hypertension restent non détectés et non traités, même si le système de santé semble offrir des soins efficaces aux personnes qui savent qu'elles souffrent d'hypertension. Une réduction des coûts des soins ambulatoires prodigués aux patients pourrait probablement améliorer la gestion de l'hypertension en Chine.

Резюме

Усиление системы здравоохранения и осведомленность, лечение и контроль гипертензии: данные системы здравоохранения Китая и долговременного исследования среди пенсионеров

Цель Отслеживание распространенности, осведомленности, лечения и контроля гипертензии в Китае спустя два-три года после масштабной реформы здравоохранения.

Методы Данные национальных медицинских осмотров, собранные в 2011-2012 гг. у жителей Китая в возрасте 45 лет и старше, включающие подробные антропометрические измерения, использовались для оценки распространенности гипертензии и процентной доли лиц с гипертензией, которые

не были осведомлены о ее наличии, не получали лечение и/или не контролировали свою гипертензию должным образом. Для оценки относительного риска (RR) применялся модифицированный метод регрессии Пуассона.

Результаты В ходе исследования гипертензивные расстройства были обнаружены приблизительно у 40% жителей Китая в возрасте 45 лет и старше. Среди лиц с гипертензией более 40% не были осведомлены о своем состоянии, около 50%

не получали медикаментозного лечения и около 50% не контролировали это состояние должным образом. В сравнении с другими лицами, страдающими гипертензией, участники страховых схем, покрывающих расходы на амбулаторное лечение, с большей вероятностью были осведомлены о своей гипертензии (приведенный показатель RR, aRR: 0,737; 95% доверительный интервал, CI: 0,619–0,878), подвергались лечению по этому поводу (aRR: 0,795; 95% CI: 0,680–0,929) и

эффективно контролировали свое состояние (aRR: 0,903; 95% CI: 0,817–0,996).

Вывод В Китае множество случаев гипертензии остаются необнаруженными и не подвергаются лечению, хотя система здравоохранения оказывает эффективную помощь лицам, которые осведомлены о своей гипертензии. Снижение расходов пациентов на амбулаторное лечение, по всей вероятности, способно улучшить контроль гипертензии в Китае.

Resumen

Fortalecimiento del sistema sanitario y concienciación, tratamiento y control de la hipertensión: datos del estudio longitudinal sobre jubilación y salud de China

Objetivo Inspeccionar la prevalencia, concienciación, tratamiento y control de la hipertensión en China dos o tres años después de la reforma principal del sistema sanitario.

Métodos Se emplearon los datos de una encuesta nacional realizada en 2011-2012 entre la población china de 45 años o más, que incluyó mediciones antropométricas en detalle, para estimar la prevalencia de la hipertensión y los porcentajes de individuos hipertensos que desconocían padecer esta condición, no recibían tratamiento, y/o no controlaban la hipertensión correctamente. Se utilizaron regresiones de Poisson modificadas para estimar los riesgos relativos (RR).

Resultados En el momento de la encuesta, casi el 40 % de los chinos de 45 años o más sufría un trastorno de hipertensión. Entre las personas hipertensas, más del 40 % no era consciente de su condición, el 50 %

no recibía ningún medicamento para la hipertensión y el 80 % no la controlaba adecuadamente. En comparación con los otros individuos hipertensos, aquellos que eran miembros de planes de seguros que cubrían los costes de la atención ambulatoria eran más susceptibles de ser conscientes de padecer hipertensión (RR ajustado, RRA: 0,737, intervalo de confianza del 95 %, IC: 0,619 a 0,878) recibir el tratamiento correspondiente (RRA: 0,795, IC del 95 %: 0,680–0,929) y controlarla de forma eficaz (RRA: 0,903; 95% CI: 0,817–0,996).

Conclusión En China muchos casos de hipertensión no se diagnostican ni se tratan, incluso aunque el sistema sanitario parece ofrecer una atención eficaz a las personas conscientes de que la padecen. Reducir las tasas de atención ambulatoria a los pacientes probablemente mejoraría la gestión de la hipertensión en China.

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