Unique approaches to hypertension control in China

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Abstract: According to the China nationwide hypertension survey in 2012–2015, the prevalence of hypertension in adults (≥18 years) was 27.9%, which increased approximately by 50% from 2002 (18.8%). The management of hypertension was improved, but still at low level, with the awareness, treatment and control rates of 46.9%, 40.7% and 15.3%, respectively. The challenge was still the low awareness and the low control rate in treated hypertension (37.5%). Several actions are currently being taken to improve hypertension control in China. In collaboration with the International Society of Hypertension May Measurement Month (MMM) Program, hundreds of volunteers across the country measured blood pressure in a large number of people in summer since 2017. In addition, a nationwide Web-based and WeChat-linked blood pressure measurement system is being built, with thousands of devices installed in public places within easy-reach of people. To improve blood pressure control in treated hypertension, two initiatives are being undertaken. One is the expanding use of ambulatory blood pressure monitoring to guide antihypertensive treatment. Another is primary aldosteronism screen in resistant hypertension. It is hoped that in the framework of the Healthy China 2030 Program the control rate of hypertension may increase in the next 10 years to 50% or higher by increasing both the awareness rate in the population and control rate in treated hypertensive patients to 70% or higher.

Keywords: China; hypertension; control; initiative

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Introduction

According to the most recent China nationwide hypertension survey in 2012 to 2015, the prevalence of hypertension in 451,755 adults (≥18 years) was 27.9%, and the awareness, treatment and control rates of hypertension were 46.9%, 40.7% and 15.3%, respectively (1) (*Table 1*). The estimated total number of hypertensive patients in adult Chinese was 244.5 million. If this survey would be compared with the preceding one in 2002 in 141,892 people of at least 18 years (2), the prevalence, treatment and control rates of hypertension increased substantially from 18.8%, 24.7% and 6.1%, respectively (2), and relatively by 48.4%, 64.8% and 150.8%, respectively (1,2). However, the awareness and control rates in treated hypertensive patients remained intolerably low, though also with a relative increase of 55.3% and 50.4% from 2002 to 2012, respectively (1,2).

China is fast growing in economy and ageing in population. The prevalence of hypertension is doomed to increase in the next few decades, because of increasing longevity and lifestyle changes. The number of elderly people in China at the end of 2017 amounted to 240.9 million (17.4% of the total population, China Industry Information, http://www.chyxx.com/industry/201801/607086.html, accessed on 13 July 2018). The increasing trend in the number of elderly people will continue for the next 20 years (those born in 1960s and 1970s), and end up with more than 400 million people older than 60 years. The number of elderly hypertensive patients will increase rapidly up to several hundred million in the next 20 years, because more than 50% of people older than 60 years had hypertension (1-3). In addition,

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Table 1 Prevalence, awareness, treatment and control rates of hypertension in two recent nationwide blood pressure surveys in China (1,2)

Year of survey	Number of subjects	Prevalence (%)	Awareness (%)	Treatment (%)	Aware and treated (%)	Control (%)	Treated and controlled (%)
2002 (≥18 years) (2)	141,892	18.8	30.2	24.7	81.8	6.1	25.0
2012–2015 (≥18 years) (1)	451,755	27.9	46.9	40.7	86.8	15.3	37.6

lifestyle in China also changes rapidly, and is characterized of a high salt, high fat, high sugar and high calorie diet, a high psychosocial stress, and a low physical activity (4). This typical lifestyle will undoubtedly further worsen the situation. If not controlled sufficiently well, hypertension will inevitably become a serious public health problem in the next 1 to 2 decades for China.

The only way to tackle the huge current and emerging cardiovascular risk of hypertension is to improve blood pressure control and to ultimately prevent organ damage and cardiovascular events. There is no other way around it. We recently started several China nationwide initiatives with a primary goal of improving awareness of hypertension in the population and blood pressure control in treated hypertensive patients (5). The present review describes what we did and we are doing to achieve the above-mentioned goal in the framework of these ongoing initiatives.

May Measurement Month (MMM) in China

In response to the call of the MMM Program of the International Society of Hypertension and the Lancet Commission on Hypertension (6,7), Chinese volunteers performed blood pressure measurements in public places in more than 100 sites across China from May to August, 2017 (6). A Web-based blood pressure measuring system, equipped with a validated automated electronic blood pressure monitor (HEM9200T, OMRON Healthcare, Kyoto, Japan), was used in most of the measurement sites. Blood pressure was measured three times consecutively and transmitted automatically via a blue-tooth connection to a smart phone and finally to a web-based data management system. We contributed data of 125,236 (10.4% of the world total) study subjects to the international collaboration in 2017 (6). In this group of Chinese people, about a third (34.5%) had hypertension. Of those with hypertension, 55% were not aware of hypertension or were aware but not treated for hypertension. Of those treated, 54% did not achieve the goal of blood pressure control (<140/90 mmHg).

In 2018, we expanded the measurement to more than 400 sites across the country. Thousands of volunteers are participating in the project and until recently have measured blood pressure in more than a quarter of million people. The measurement will continue to the end of July 2018. Hopefully, this project will continue for the next few years and eventually help the Chinese people improve their awareness to measure blood pressure regularly.

A Web-based and WeChat-linked blood pressure measurement system

China has established a nationwide public primary care system. In each of the urban and rural primary administrative regions, there is a community health service center, usually with a centralized healthcare facility and several satellite healthcare service sites. The primary care offers free of charge blood pressure measurements for the residents. This service theoretically should improve awareness of hypertension. However, most of the people who often visit the community health center for blood pressure measurement are treated hypertensive patients, instead of those people who do not know their blood pressure.

Home blood pressure monitoring may also improve awareness of hypertension (8,9). The annual sales volume of home blood pressure monitors increased approximately 10-fold over the past 10 years from about 3 million in 2008 to more than 30 million in 2017 (China Industry Information, http://www.chyxx.com/industry/201704/511539.html, accessed on 13 July 2018). Thus, home blood pressure monitors are readily available for blood pressure measurement at home. To guide home blood pressure monitoring, an expert consensus document was published in 2012 (10). However, the increase in the awareness of hypertension in the past 10 years was not in proportion to that of the number of blood pressure monitors. The reason remains under investigation. It is possible that these blood pressure monitors, like the free of charge service of blood pressure measurement offered by the community health

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center, are not really used by people who do not know their blood pressure but well believe that their blood pressure must be normal. It is also possible that even after blood pressure is measured, people have no idea on whether their blood pressure is normal or not and what to do with their blood pressure.

Whatever the reasons are, a huge sales volume of home blood pressure monitors has not been transformed into a sufficiently high awareness of hypertension (1,2). We therefore plan to establish a nationwide Web-based and WeChat-linked blood pressure measuring system in public places within easy reach of people. Measurement strictly follows a standardized procedure. After at least 5 minutes rest in the seated position, blood pressure is measured three times consecutively with a time interval of 30 seconds. After measurement, blood pressure and pulse rate readings will be automatically transmitted to his or her WeChat account with immediate judgement of abnormality, and if he or she agrees also to his or her physician for further online clinical counseling. It is hoped that the system can be built in the whole country on various commercial or non-commercial models, and will measure blood pressure in tens of millions of people every year, and increase the awareness rate from the current less than 50% to more than 75% before 2030.

Web-based programming and interpretation of ambulatory blood pressure monitoring

Ambulatory blood pressure monitoring is useful in the identification of white-coat and masked hypertension and in risk prediction by defining the night-to-day ratio and morning surge of blood pressure (11,12). This technique is recommended for routine use in the diagnosis and therapeutic monitoring of hypertension by several hypertension guidelines (13-15). Though not recommended mandatory by the Chinese hypertension guidelines (16), ambulatory blood pressure monitoring is reimbursed for the diagnosis, risk assessment and therapeutic monitoring of hypertension by health insurance in most of the China provinces. However, the programming of blood pressure monitors is often not in accordance with the current guidelines (12), and physicians often have difficulties in the interpretation of the results of a recording.

To standardize the programming and interpretation of an ambulatory blood pressure recording according to the current guidelines (12), a Web-based platform has been established recently, and is increasingly used in hospitals and primary care centers in China. With this platform, technicians log on a website to initialize the ambulatory blood pressure monitor and to upload the data of a recording. Data analysis will be performed in a remote server. The output results will be generated and interpreted by an expert. Then, technicians may retrieve the data and send the output to a printer or the WeChat account of the patient and, if there is one, the physician as well. The diagnostic and therapeutic decisions can be taken on the basis of ambulatory blood pressure.

In addition to standardized programming and expert interpretation, this dedicated platform has several other advantages over the software of commercial devices. First, this platform makes it possible and feasible to perform ambulatory blood pressure monitoring in non-clinical settings, such as pharmacies and nursing homes, and in the future at patients' homes. One of the hurdles for ambulatory blood pressure monitoring in a large number of patients is its feature of high labor demanding. A non-clinical or home setting may be more appropriate for ambulatory monitoring. Second, the platform can be more frequently updated on the basis of new knowledge and guidelines. There are quite a number of novel findings that have not yet been implemented in any software of commercial devices (17). Third, the platform can be efficient for multicenter clinical research on ambulatory blood pressure monitoring. There is urgent need of randomized outcome trials on the use of ambulatory blood pressure in the management of hypertension.

Primary aldosteronism screen in resistant hypertension

Resistant hypertension is common, and often has secondary causes of hypertension. In fact, one of the aims to define resistant hypertension was to identify and treat secondary causes of hypertension (18,19). The recent 2017 American hypertension guidelines recommended screen for various secondary causes of hypertension in resistant hypertension (20). On the very top of the screening list of secondary hypertension was primary aldosteronism. It is high time to do primary aldosteronism screen in resistant hypertension.

There is guideline and consensus on the diagnosis and treatment of primary aldosteronism (21,22). In China, however, the situation is that endocrinologists have the expertise of primary aldosteronism (23), but cardiologists manage hypertension, including resistant hypertension (19). Few Chinese cardiologists have sufficient awareness

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and knowledge to do primary aldosteronism screen. A nationwide program was therefore initiated for primary aldosteronism screen among Chinese cardiovascular physicians. We urge them to measure plasma renin and aldosterone concentration and to calculate the aldosterone-to-renin ratio in resistant hypertension. If the aldosterone-to-renin ratio is positive, they may continue the diagnostic procedure of primary aldosteronism or refer patients to their endocrinology colleagues.

In fact, cardiovascular physicians have advantages in the diagnosis of primary aldosteronism. Intervention cardiologists themselves may manage and develop the adrenal venous sampling technique for the lateralization of primary aldosteronism (24,25). They may explore novel intervention treatments, for instance, transcatheter arterial ablation of aldosteronoma with absolute ethanol (26).

Perspectives of hypertension control in China

The current situation with extremely low control rate of hypertension has to change soon. It is hoped that our nationwide hypertension control initiatives will substantially improve public awareness of hypertension outside the hospital and physicians' expertise in controlling hypertension inside the hospital, and ultimately increase the control rate of hypertension in China, the most populous country in the world.

A goal for the management of hypertension has been set up since 2017 in the framework of the Healthy China 2030 Program (https://baike.sogou.com/v156347605.htm#para2, accessed on 13 July 2018). The goal is that the control rate of hypertension should increase in the next 10 years to 50% or higher by increasing both the awareness rate in the population and control rate in treated hypertensive patients to 70% or higher (27). It may be ambitious, but is possible.

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Footnote

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