HYPERTENSION CARE IN THAILAND
BEST PRACTICES AND CHALLENGES
2019
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2019
Authorship and acknowledgements

List of co-authors

Dr Suwannachai Wattanayingcharoenchai, Director-General, Department of Disease Control, Ministry of Public Health (MoPH)

Dr Supattra Srivanichakorn, Senior Expert, Department of Disease Control, (MoPH)

Dr Sasithorn Tangsawad, Director, Division of Noncommunicable-Disease, Department of Disease Control, (MoPH)

Dr Sushera Bunluesin, National Professional Officer, WHO Thailand

Dr Renu Garg, Medical Officer, WHO Thailand

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Acronyms and abbreviations

ACEI angiotensin-converting enzyme inhibitor
ARB angiotensin II receptor blocker
BP blood pressure
BRFSS Behavioural Risk Factor Surveillance Survey
CCB calcium-channel blocker
CI confidence interval
CPG (Thai) clinical practice guideline
CSMBS Civil Servant Medical Benefit Scheme
CVD cardiovascular disease
DALY disability-adjusted life year
DBP diastolic blood pressure
FDC fixed-dose combination
FETP Field Epidemiology Training Programme
HIS health information system
IHD ischaemic heart disease
IT information technology
MedResNet Medical Research Network of Thai Medical Schools Consortium
MoPH Ministry of Public Health
NCD noncommunicable disease
NHES National Health Examination Survey
NHSO National Health Security Office
NNT number needed to treat
SBP systolic blood pressure
<table>
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<tr>
<th>Acronym</th>
<th>Description</th>
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<tr>
<td>SOP</td>
<td>standard operating procedure</td>
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<tr>
<td>SSS</td>
<td>Social Security Scheme</td>
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<tr>
<td>STAG</td>
<td>Strategic Technical Advisory Group</td>
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<tr>
<td>THB</td>
<td>Thai Baht</td>
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<tr>
<td>UHC</td>
<td>universal health coverage</td>
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<tr>
<td>VHV</td>
<td>village health volunteer</td>
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<tr>
<td>WCH</td>
<td>white coat hypertension</td>
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<td>WHO</td>
<td>World Health Organization</td>
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</table>
Hypertension (raised blood pressure ≥140/90 mmHg) is common among Thais and is on the rise. One out of 4 adult Thais have hypertension.

Hypertension causes more than 50,000 deaths annually.

Of an estimated 13.2 million with hypertension, barely one third have their blood pressure under control.

Cardiovascular disease, including stroke and ischaemic heart disease (IHD), account for a quarter of all deaths.

Mortality from stroke has doubled and mortality from IHD increased 50% in the past decade.

Two third of stroke cases and half of IHD cases are attributed to hypertension.

Effective treatment and control of hypertension over five years can avert more than 14,000 deaths, 27,000 strokes and 18,000 heart attacks.

Best practices

- Strong primary health care system with universal health coverage provides a strong foundation for scaling up hypertension care nationwide
- Hypertension care is a national priority and is steered by a high-level National Strategic Technical Advisory Group on hypertension
- A culture of evidence-based policy and programme development
- Patient-centric care close to the home
- Regular supply of drugs and 3-month prescription
- Committed team of health workers
- Measurement of BP is a standard of care for every patient
- Unique patient ID with longitudinal electronic record for every patient
Challenges

Low rate of diagnosis: despite extensive screening at health facilities and in communities, nearly half of those with hypertension are not diagnosed. A huge number of opportunities for diagnosis are missed due to patient and health system factors.

Treatment inertia: lack of a simple treatment protocol and variable treatment practices among physicians result in suboptimal blood pressure control among treated patients.

Health system barriers: access to diagnosis and treatment is limited, especially for the younger, working population.

Limited collaboration with the private sector: approximately 30–40% of hypertension care is delivered by non-MoPH and private sector health facilities, which is variable in quality and outside the purview of regular monitoring.

The way forward

More can be done to improve hypertension control.

Reduce diagnostic inertia by improving the quality of screening at health facilities and in communities and by instituting locally feasible mechanisms to follow up those found with a raised blood pressure during screening.

Reduce treatment inertia by using a simple treatment protocol, fixed-dose combination pills and conducting regular clinical audits to ensure adherence to the treatment protocol.

Collaborate with the private sector to increase access to hypertension care for the working population.

Analyse and use routinely collected data to drive progress in control of hypertension.
การรักษาที่มีประสิทธิภาพและการควบคุมระดับความดันโลหิต จะสามารถป้องกันการเสียชีวิตได้ถึง 14,000 คน ถ้าทั้งปวงกันการจับปะปัญหาใจวายจากโรคหลอดเลือดสมองลงได้ถึง 27,000 คน และโรคหัวใจตายได้ถึง 18,000 คน

**ปัจจัยส่งผลการ**

การรักษาที่มีประสิทธิภาพ และการควบคุมระดับความดันโลหิต จะสามารถป้องกันการเสียชีวิตได้ถึง 14,000 คน ถ้าทั้งปวงกันการจับปะปัญหาใจวายจากโรคหลอดเลือดสมองลงได้ถึง 27,000 คน และโรคหัวใจตายได้ถึง 18,000 คน

**แนวทิศปฏิบัติที่ดี**

**Best practices**

ระบบบริการสุขภาพปฐมภูมิที่เข้มแข็ง ร่วมกับหลักประกันสุขภาพหลักขั้นพื้นฐานมีเป็นฐานที่สำคัญใน การกระตุ้นการให้บริการแลกเปลี่ยนโรคความดันโลหิตสูงของประเทศไทย

**การให้บริการสุขภาพที่มีผู้ป่วยเป็นศูนย์กลาง**

การให้บริการสุขภาพที่มีผู้ป่วยเป็นศูนย์กลาง ได้นำไปใช้ข้อมูลเชิงประจักษ์

**การให้บริการอย่างมีชื่อเสียงและการพัฒนาการ ดำเนินงานโดยใช้ข้อมูลเชิงประจักษ์**

การให้บริการอย่างมีชื่อเสียงและการพัฒนาการดำเนินงานโดยใช้ข้อมูลเชิงประจักษ์

**การรับผิดชอบในที่มีกลุ่มผู้ป่วย**

ที่มีความสุขที่มีความทุกข์

**การรับผิดชอบในที่มีกลุ่มผู้ป่วย**

ที่มีความสุขที่มีความทุกข์

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ที่มีความสุขที่มีความทุกข์

**การรับผิดชอบในที่มีกลุ่มผู้ป่วย**

ที่มีความสุขที่มีความทุกข์
ความท้าทาย Challenges

อัตราการได้รับการวินิจฉัยว่าเป็นโรคความดันโลหิตสูงยังอยู่ในระดับต่ำ: ถึงแม้ว่าจะมีการตรวจคัดกรองความดันโลหิตสูงทั้งในสถานพยาบาลและในชุมชนเป็นจำนวนมาก แต่เกือบครึ่งหนึ่งของผู้ที่มีภาวะความดันโลหิตสูงก็ยังไม่ได้รับการวินิจฉัยว่าเป็นความดันโลหิตสูง จึงมีผู้ป่วยจำนวนมากมายที่พลาดโอกาสในการได้รับการตรวจวินิจฉัยและรักษา เนื่องด้วยปัจจัยของผู้ป่วยเอง และระบบบริการสุขภาพ

ความล่าช้าในการให้การรักษา (treatment inertia): ไม่มีการจัดทำแผนทางการรักษาที่เรียบง่าย และรูปแบบการให้การรักษาที่แตกต่างกันไปในแต่ละสถานะการณ์ ทำให้การควบคุมระดับความดันโลหิตของผู้ป่วยไม่ได้ทำาที่รวดเร็ว

อุปสรรคของระบบบริการสุขภาพ: การเข้าถึงการวินิจฉัยและรักษาโรคความดันโลหิตสูงที่ยังมีจำกัด โดยเฉพาะในประชาชนอายุน้อย และวัยทำงาน

ข้อจำกัดของความร่วมมือกับภาคเอกชน และอื่นๆ: ประมาณร้อยละ 30-40 ของการดูแลรักษาโรคความดันโลหิตสูงนั้น ให้บริการโดยสถานพยาบาลที่ไม่ได้อยู่ภายใต้กระทรวงสาธารณสุข และเอกชน ซึ่งมีความหลากหลาย ทั้งในเชิงคุณภาพ และอยู่นอกเหนือการกำากับติดตาม

ก้าวต่อไป The way forward

ข้อเสนอเพื่อการพัฒนาการควบคุมความดันโลหิตสูง
เพื่อยกระดับการวินิจฉัย โดยพัฒนาคุณภาพของการตรวจคัดกรองความดันโลหิตสูง ณ สถานพยาบาล และในชุมชน และดำเนินการให้ที่เป็นไปได้ในระดับพื้นที่เพื่อการดูแลคนผู้มีภาวะความดันโลหิตสูงให้ได้รับการตรวจวินิจฉัยที่โรงพยาบาล

ลด treatment inertia โดยการพัฒนาแนวทางการรักษาที่เรียบง่าย การใช้ยาสูตรผสม และดำเนินการตรวจประเมินคุณภาพของคลินิกมืออาชีพเพื่อให้มั่นใจว่าการรักษาแบบนี้เป็นไปตามแนวทางที่กำหนดไว้

ร่วมมือกับภาคเอกชนเพื่อเพิ่มการเข้าถึงการรักษาโรคความดันโลหิตสูงในกลุ่มประชาชนวัยทำงาน

วิเคราะห์และใช้ข้อมูลจากระบบบริการสุขภาพในการปรับแต่งความก้าวหน้าของการควบคุมโรคความดันโลหิตสูง
Chapter 1. Introduction
1.1 Burden of cardiovascular disease

Cardiovascular disease (CVD) is the leading cause of mortality in Thailand and is responsible for approximately a quarter of all deaths (1). Stroke and ischaemic heart disease (IHD) were the top two causes of mortality among the Thai population in 2017 (2). While the overall mortality declined by 6.1 per 100 000 population annually from 2001 to 2014 (3), mortality due to CVD continued to increase over the same period. Over the past decade, the mortality rate more than doubled for stroke (from 21 to 48 per 100 000 population) and increased by 50% for IHD (from 21 to 32 per 100 000 population) (Fig. 1.1) (4). Additionally, the morbidity burden from CVD is substantial. A large, nationally representative community-based survey showed that the age-standardized prevalence of stroke was 1850 per 100 000 population, higher in men (2740/100 000) than in women (1390/100 000) (5).

**Fig. 1.1.** Trends in mortality due to cardiovascular disease, 2008–2017, Thailand

In addition to the high burden of mortality and morbidity, CVD is a major liability for patients and families. In 2014, stroke and IHD were responsible for over 1.7 million disability-adjusted life years (DALYs) lost, representing nearly a quarter of all DALYs (6). The high medical care costs for treating CVD strains the universal health coverage (UHC) budget. The reported medical cost of a single hospitalization for acute care of a stroke patient ranged from Thai Baht (THB) 20 740 (US$ 700) to THB 55 405 (US$ 1847) (7). In addition, there are substantial hidden costs related to the informal care provided to stroke survivors by family members, which also cost Thai society. A study conducted among 101 stroke survivors estimated that, in 2006, the average monthly time spent on informal care was 94.6 hours; this translated into THB 4643 (US$ 155) in monetary value (8).
1.2 Burden of hypertension

1.2.1 Population-attributable fraction

Raised blood pressure (BP) (systolic BP [SBP] ≥140 mmHg and/or diastolic BP [DBP] ≥90 mmHg), also referred to as hypertension, is a major risk factor for CVD. According to the Thai Burden of Disease Study 2014, an estimated 52,318 deaths were attributed to hypertension out of a total of 486,000 deaths (9). The population-attributable fraction of stroke and IHD due to hypertension was 66% and 50%, respectively (personal communication, Kanitta Bundhamcharoen, Senior Researcher, International Health Policy Programme, 17 September 2019).

1.2.2 Prevalence

Hypertension is common among Thais and is on the rise. The overall prevalence of hypertension increased from 21% in 2003 to 25% in 2014 (10). In the most recent survey (2014), the prevalence increased with age and was slightly higher among men (26%) than women (24%) (Fig. 1.2). Significant geographical variations in prevalence were noted, with the highest prevalence in the North Region (33%), followed by the South Region (28%), the Central Region (23%), Bangkok (23%) and the Northeast Region (21%). The prevalence of hypertension was similar among populations living in urban and rural areas.

**Fig. 1.2. Prevalence of hypertension by age and sex, Thailand, 2014**

![Bar chart showing prevalence of hypertension by age and sex in Thailand, 2014.](chart.png)

*Source: National Health Examination Survey 2014*
1.2.3 Incidence

In a large cohort study among adult Thai university students, the incidence of hypertension reported by the students as having been diagnosed by a doctor over a four-year period was 3.5% (5.2% in men and 2.1% in women) \( (11) \). The risk of developing hypertension was associated with older age and the presence of comorbidities such as obesity, diabetes, kidney disease and dyslipidaemia. Those who drank regularly and consumed instant foods were at a higher risk of developing hypertension. A higher level of physical activity was associated with a lower incidence of hypertension. The incidence of hypertension did not vary by education or income level.

1.3 Awareness, treatment and control of hypertension

Repeated population-based cross-sectional surveys indicate that diagnosis, treatment and control of hypertension at the community level have been steadily increasing. Over the past decade, the percentage of people who were aware of their diagnosis increased from 29% to 55%. Treatment coverage increased from 24% to 49% and BP control from 8.6% to 30% \( (11) \). Despite consistent progress, much more needs to be done to improve BP control at the population level. Extrapolation of survey data to population size in 2019 shows that out of an estimated 13.2 million adult Thais with hypertension, only 3.9 million have their BP under control (Fig. 1.3). Effective treatment of hypertension can help save lives by preventing stroke and heart attack. Applying number needed to treat (NNT) project assumptions \( (12) \), effective treatment and control of BP among the 9.3 million people with hypertension in Thailand who are currently uncontrolled can avert more than 14 000 deaths, 27 000 strokes and 18 000 heart attacks over a period of five years. Thailand has set a target to reduce premature mortality from CVD and other noncommunicable diseases (NCDs) by 25% by 2025. Improving control of hypertension can greatly contribute to this goal.

**Fig. 1.3. Prevalence, awareness, treatment and control of hypertension among the Thai population, 2014**

Source: National Health Examination Survey 2014
1.4  Aim of the report

This report highlights the burden of CVD and describes how the government provides hypertension care within its public health system. The report gives an overview of Thailand’s primary health care infrastructure and describes facilities for the screening, diagnosis, treatment and monitoring of hypertension. Success factors and best practices that have led to a high coverage of hypertension care are highlighted. Current programmatic challenges that need to be addressed as well as new initiatives and priority actions for further improving the coverage and quality of hypertension care are also described.

1.5  Sources of data

The information and data presented in this report were derived from multiple sources listed below:

- **Published literature**: English and Thai scientific reports and publications from the peer-reviewed and grey literature were referred to. References are provided at the end of each chapter.

- **Health Data Centre (HDC) database**: HDC is a large database of the Ministry of Public Health (MoPH). It includes data generated at the point of service delivery both in communities and at health facilities all over Thailand. These data are collected and stored in a standard format, referred to as the “43 folder system”. Data are uploaded and transferred by MoPH staff from facility level upwards to a central level using cloud technology. The report uses standard indicators displayed on the HDC dashboard as well as additional analyses of the raw data in the HDC database (13).

- **Population-based surveys**: the National Health Examination Survey (NHES) is a large, nationally representative survey with a sample size exceeding 40,000. The survey is conducted every 5 years to monitor NCD risk factors in the population (10) using a structured questionnaire, physical examination and laboratory investigations. The latest NHES was conducted in 2014. The Behavioural Risk Factor Surveillance Survey (BRFSS) is a subnational survey conducted in selected provinces every 5 years, and collects information on risk factors by administering a questionnaire only (14). The latest BRFSS was conducted in 2018.

- **Health facility surveys**: in 2018, the MoPH with support from World Health Organization (WHO) undertook a survey to assess the infrastructure, staffing and clinical quality of hypertension care in Thailand. The assessment included a review of clinical records of 1406 patients, observation of infrastructure and equipment, and interview of 200 patients at 16 randomly selected health facilities (15). This survey is referred to as the “Rapid Hypertension Care Assessment Survey 2018” in this report. The report also draws from nationwide health facility surveys conducted by MedResNet, a research network of Thai Medical Schools (16).

- **Other sources**: additional sources of information included field visit trip reports of staff of the MoPH and WHO, minutes of meetings, and personal communication with MoPH staff, programme managers and experts.
References

Chapter 2. Health-care system in Thailand
2.1 Overview of health systems development in Thailand

Thailand is internationally acclaimed for its progressive health development policies. Sustained political commitment by successive governments, technical health leadership within the MoPH backed by a strong civil society movement were among the key drivers responsible for significant developments in health systems over time.

Since 1977, as part of the fourth National Social and Economic Development Plan, there was large-scale investment in government health-care delivery systems, particularly in the primary health care system, district health infrastructure and provincial referral hospitals. Full coverage of district hospitals was achieved by 1990. This was followed by the development of health centres (also known as health-promoting hospitals) at subdistrict level. By the 2000s, all subdistricts had a health centre. The achievement of full coverage of health services by the district health system was accompanied in parallel by health workforce development policies that included recruitment, training, distribution and rural retention (1). As a result, today Thailand has a self-reliant health-care workforce with high quality standards. In 2015, Thailand had 2.8 physicians, nurses and midwives per 1000 population, slightly higher than the 2.28 minimum threshold required by WHO (2). A well-functioning primary health care system with a strong workforce eventually paved the way for achieving UHC.

2.2 Universal health coverage

The Royal Government of Thailand has progressively expanded access to health care and financial risk protection for its population over the past three decades. Starting with a free medical care programme in 1975, which covered 30% of the population, UHC gradually covered 71% of the population by 2000 (3). In 2001, a government was elected with a manifesto to introduce the Universal Health Coverage Scheme (UCS). After the government came into power, the UCS was rolled out nationwide in April 2002.

Currently, three public insurance schemes are used: (i) Civil Servant Medical Benefit Scheme (CSMBS) for civil servants and their dependents; (ii) Social Security Scheme (SSS) for formal workers; and (iii) UCS for the rest of the population. The coverage of each is 6%, 19% and 75%, respectively. Key features of each scheme are shown in Table 2.1.

Investments in health development and UCS have greatly contributed to increasing access to care, reducing financial risk and improving equity. The utilization rate of outpatient visits increased by 13% from 2002 to 2006 with 3.5 visits per capita per year in 2016 (4). Of total health spending, out-of-pocket expenditure decreased from 34% in 2000 to 12% in 2014 (7). It is estimated that UCS has alleviated poverty for at least 1 million Thai citizens and reduced the number of health-impoverished households by 38%. UHC has also greatly reduced inequity by reducing differences in infant mortality among provinces across regions (5).
Table 2.1. Features of Thailand’s health insurance schemes, 2016

<table>
<thead>
<tr>
<th></th>
<th>Civil Servant Medical Benefit Scheme</th>
<th>Social Insurance Scheme</th>
<th>Universal Health Coverage Scheme</th>
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</thead>
<tbody>
<tr>
<td>Purchaser</td>
<td>Department of Comptroller General, Ministry of Finance</td>
<td>Social Security Office, Ministry of Labour</td>
<td>National Health Security Office</td>
</tr>
<tr>
<td>Population coverage</td>
<td>4.4 million</td>
<td>10.6 million</td>
<td>48 million</td>
</tr>
<tr>
<td>Source of finance</td>
<td>Tax-based, non-contributory</td>
<td>Tripartite contribution by employer, employee and government</td>
<td>Tax-based, non-contributory</td>
</tr>
<tr>
<td>Provider choice</td>
<td>Free choice of public provider; some services, especially emergencies and elective surgeries, are also provided by private providers</td>
<td>Annual choice of public and private hospitals (more than 100 beds) as main providers</td>
<td>Annual choice of mostly public primary care-based providers with referral system mainly in public sector</td>
</tr>
<tr>
<td>Expenditure in 2016 (THB)</td>
<td>71.02 billion</td>
<td>37.7 billion</td>
<td>109.3 billion</td>
</tr>
<tr>
<td>Payment method</td>
<td>Outpatient: fee for service; inpatient: diagnostic related groups with multiple cost bands</td>
<td>Outpatient: fee for service; inpatient: diagnostic related groups within global budget</td>
<td>Outpatient and prevention and health promotion: capitation; inpatient: diagnostic related groups within global budget; fee schedule for specific high-cost procedures</td>
</tr>
</tbody>
</table>

Sources: Adapted from Tangcharoensathien et al., 2018; and Thaiprayoon and Wiboonpolprasert, 2017

2.3 Organization of the health sector

The MoPH is the national health authority responsible for developing health policies and strategies and enforcing regulations. It is the main provider of health-care services at the national, provincial, district and subdistrict levels, especially in rural areas (6). The distribution
of health facilities in Thailand, both public and private, is shown in Fig. 2.1. The majority of hospitals are public hospitals accounting for 79% of all inpatient beds. In addition to the MoPH, health care is provided by university teaching hospitals, military hospitals and private sector health facilities. The private sector generally has a smaller role than the public sector in health-care delivery. In 2015, the private sector contributed to only 14% of total outpatient visits and 11% of total inpatient hospital admissions (7). Most private hospitals are small, with fewer than 100 beds. Large private hospitals are located in Bangkok and cater mainly to international patients. The bottom line is that the foundation of the primary health care delivery system in Thailand is attributable to the extensive public infrastructure and geographical coverage of MoPH primary health care facilities right up to the subdistrict level.

Fig. 2.1. Health-care facilities in Thailand, 2015

<table>
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<tr>
<th>Province</th>
<th>48 Specialized hospitals</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>26 Regional hospitals</td>
</tr>
<tr>
<td></td>
<td>71 Provincial hospitals</td>
</tr>
<tr>
<td>District</td>
<td>734 District hospitals</td>
</tr>
<tr>
<td>Subdistrict</td>
<td>9,768 Health centres</td>
</tr>
<tr>
<td></td>
<td>365 Community medical centres</td>
</tr>
<tr>
<td>MoPH facilities</td>
<td>322 Private hospitals</td>
</tr>
<tr>
<td></td>
<td>17,671 Private clinics</td>
</tr>
<tr>
<td></td>
<td>11,154 Pharmacies</td>
</tr>
<tr>
<td>Non-MoPH / government facilities</td>
<td></td>
</tr>
<tr>
<td>Private facilities</td>
<td></td>
</tr>
</tbody>
</table>

Note: MoD: Ministry of Defence; MoI: Ministry of Interior

2.4 Primary health care infrastructure

A district health system, consisting of a district hospital together with a number of health centres at subdistrict level, is the backbone of the primary health care system. Each district hospital serves a population of 30,000–50,000 and has inpatient facilities. The size of a district hospital varies from 30 to 150 beds, depending on the population size of the district. A district hospital provides comprehensive preventive, promotive and curative services and makes
referrals as needed. Typically, each 30-bedded district hospital is staffed with approximately three to four general physicians, 30 nurses, two to three pharmacists, one to two dentists and more than 20 paramedics and other administrative staff. In large district hospitals, specialists covering obstetrics, surgery, paediatrics and other specialties may be available. With some variation, each district hospital is linked with 8–12 health centres. Each health centre covers a population of 3000–5000 persons and has a team of 3–5 nurses and paramedics. It is the first point of contact for the population for preventive, promotive and basic curative services. At the village level, there are about 10 village health volunteers (VHVs) for each village who provide health information/education to the community and support health centre staff in conducting community-based screening and other activities. VHVs also support patients and families in providing long-term care.

Fig. 2.2. Primary health care infrastructure of the Ministry of Public Health at district level
References


Chapter 3. Organization of hypertension care services
3.1 Overview of hypertension care services

Recognizing the rising burden of NCDs, the Royal Government of Thailand included the treatment of hypertension and diabetes in the UHC benefit package in 2002. Screening, diagnosis, treatment and laboratory monitoring for hypertension is offered free of charge to everyone within the primary health care system and is fully covered by one of the three insurance schemes. Hypertension is the most common NCD risk factor treated at outpatient clinics in MoPH health facilities, followed by dyslipidaemia and diabetes. At provincial and regional hospitals, hypertension is managed daily at the internal medicine clinics of the outpatient department. At district hospitals, hypertension is managed at NCD clinics of the outpatient department. Some district hospitals have designated days on which hypertension patients are treated, for example, every Monday and Wednesday, whereas others treat hypertension every day. At health centres, a special OPD is organized once a month for hypertension and is often overseen by a visiting physician. Patients seeking care on other days also receive care and prescription refills by clinical nurses. Hypertension care services offered at different levels of the health-care system are depicted in Fig. 3.1 (1).

Fig. 3.1. Package of hypertension care services provided at different levels of the health-care system

3.2 Organization and flow of patients at health facilities

Many district hospitals have special NCD clinics that serve as a one-stop service for patients receiving chronic care, from registration to vital data collection to laboratory investigations and dispensing medication. An example of the way hypertension services are organized at a district hospital is shown in Fig. 3.2.
1. **Registration counter:** the registration desk is the first point of contact. In some health facilities, patients are sorted through a numbered colour-coded registration system: *green* for those with appointments, *yellow* for older patients as a fast-track option, and *blue* for general outpatients without appointment.

2. **Height and weight measurement station:** body weight and height measurements are collected at every visit for every patient.

3. **Blood pressure measurement station:** the BP is measured for every outpatient. In most facilities, patients self-measure BP with an automated BP measuring device attached to a printer.

4. **Laboratory:** patients needing a scheduled blood test for serum electrolytes, renal functions or other test go to the special laboratory of the NCD clinic or to the general laboratory of the health facility. At subdistrict health centres, where there is no laboratory, blood is collected and sent to the district hospital for testing.

5. **Nurse desk/room:** a nurse takes the current medical history and measures the BP again if the self-measured reading is ≥140/90 mmHg. Patients with a BP ≥180/110 mmHg are immediately referred to the emergency room. The nurse enters all the information, including the BP reading, in the patient’s individual electronic health record for review by the doctor. After this, the patient waits in queue to see the doctor. During this period, group health education is provided by a nurse or a pharmacist, as per staff availability.

6. **Doctor room:** the doctor accesses the electronic health record of each patient using the unique ID and reviews the history and current information, including the BP reading. The doctor prescribes/adjusts the medication, as needed.

7. **Follow-up appointment desk:** after meeting the doctor, the patient meets with another nurse, who reviews the patient’s record electronically, and gives the next appointment for consultation and/or laboratory test as per the doctor’s prescription.

8. **Pharmacy:** the last stop is the pharmacy. The pharmacist accesses the patient’s electronic health record, and provides the medicines prescribed by the doctor after checking for any excess/leftover medicines from the previous visit.
Fig. 3.2. Typical sequence and flow of patients receiving hypertension care at a district hospital

1. Registration counter
2. Height and weight measurement station
3. Blood pressure measurement station
4. Laboratory for scheduled tests, if any
5. Nurse consultation for BP remeasurement, history-taking
6. Doctor consultation
7. Follow-up appointment desk
8. Pharmacy

Group health education while waiting to see doctor
3.3 Equipment for screening and diagnosis

In compliance with the Minamata Convention, Thailand is phasing out mercury sphygmomanometers and replacing them with digital BP measurement devices. At all provincial and district hospitals and at most health centres, an automated (arm-in) digital BP measurement device with an attached printer is available. At the community level, a portable digital BP instrument is used. Each health facility is required to have a predetermined list of functional equipment in adequate numbers. These include: a weighing scale, stadiometer, BP measurement device, waist measurement tape, fundus camera and ankle–brachial index tool. In addition, these equipment are required to have a documented record (proof) of maintenance and calibration at least once every year (1). In 2013, the Department of Medical Sciences tested a total of 1233 BP measurement devices from hospitals and health centres in eight provinces and reported that 81% of the devices met with the required standards (2).

3.4 Laboratory facilities and investigations

Laboratories range in sophistication from state-of-the-art, fully automated, digitally linked facilities at provincial and regional hospitals to well-equipped laboratory facilities at district hospitals. Health centres have no laboratory facilities. However, for patients receiving follow-up care at health centres, blood is collected and sent to the district hospital for testing, and results are received back and communicated to the patients. A wide range of laboratory tests are covered under the UCS for all beneficiaries, including fasting blood glucose, HbA1C, serum creatinine, serum electrolytes, lipid profile and urine microalbumin. The frequency of investigations among treated patients is high (Fig. 3.3) (3).

Fig. 3.3. Percentage of treated patients with hypertension receiving a laboratory test during 2018, Thailand (N=36 557 patients)

3.5 Facilities for treatment

The most common drugs used to treat hypertension are: angiotensin-converting enzyme (ACE) inhibitors (enalapril 5, 10 and 20 mg), angiotensin II receptor blockers (ARBs; losartan 50 and 100 mg), calcium-channel blockers (CCBs; amlodipine 5 and 10 mg), beta-blockers (propranolol 10 mg) and diuretics (hydrochlorothiazide 25 and 50 mg). All these drugs are included in the national essential medicines list. In addition, simvastatin is available for the treatment of patients with dyslipidaemia/high CVD risk and aspirin for patients with prior CVD. All medicines are generic, produced locally. Medicines are available in blister packs, which allow dispensing for longer periods of time. They are usually dispensed for a variable period of time depending on the patient’s BP control and size of the hospital. For stable patients (consistent control), drugs are prescribed for up to 16 weeks (4).

Table 3.1. Period for which medicines are dispensed by size of health facility and status of blood pressure control, Thailand, 2018

<table>
<thead>
<tr>
<th></th>
<th>BP controlled</th>
<th>BP uncontrolled</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Average (weeks)</td>
<td>Range (weeks)</td>
</tr>
<tr>
<td>Provincial hospital</td>
<td>12</td>
<td>10–16</td>
</tr>
<tr>
<td>District hospital</td>
<td>10</td>
<td>6–12</td>
</tr>
<tr>
<td>Health centre</td>
<td>10</td>
<td>8–12</td>
</tr>
</tbody>
</table>


The Rapid Hypertension Care Assessment Survey, 2018 found that no health facility reported a drug stock-out or a situation when they had to send back a patient without drugs (4). Thailand has a well established inventory control system for procurement, storage and distribution of drugs. While the specifications of the medicines procured are according to the national list of essential medicines and MoPH regulations, the district drug committee can make decisions about the drugs used in the hospitals and health centres of the district.

3.6 Human resources for hypertension and other NCD services

Health personnel responsible for hypertension and other NCD care includes physician, clinical nurse, pharmacist and data recorder at the district hospital level supported by clinical and public health nurses and community health volunteers at the health centre level. The primary function of each personnel with regard to hypertension care includes the following:

**Physician**

- Re-measure the BP (among selected patients).
- Assess CVD risk and target organ damage (TOD).
- Provide a diagnosis and prescribe treatment.
• Adjust the dose of medication at follow-up visits.
• Monitor side-effects and complications of drugs.
• Order laboratory tests.
• Provide counselling to patients with uncontrolled hypertension and complications.

**Nurse**
• Organize and manage hypertension care services at the clinic and in the catchment population.
• Measure/re-measure the BP.
• Adjust medicines in consultation with the doctor (some areas).
• Re-fill the prescription for medications.
• Monitor side-effects from medications.
• Make follow-up appointments for patients.
• Provide individual counselling and/or group health education on adopting healthy lifestyles.
• Provide training to community health volunteers.
• Conduct home visits.
• Track BP control in the catchment population.

**Pharmacist**
• Dispense medications according to the doctor’s prescription and provide information to patients on drug use.
• Monitor the side-effects of medications.
• Provide health education on medications and their side-effects.
• Provide individual and/or group counselling on drug use, the importance of adherence and side-effects.
• Manage stocks and procure, store and distribute drugs.
• Maintain records and prepare reports related to drug stocks.

**Data recorder**
• Perform data entry.
• Upload data onto the server at periodic intervals.
• Cross-check data and make corrections in the files based on feedback and in coordination with information technology (IT) staff at the provincial level.
• Prepare a line list of patients to track the BP and other risk factors.
● Generate a list of patients with missed appointments.
● Generate monthly/quarterly reports of the population in the catchment area.

Community health volunteers
● Support community-based screening.
● Support home BP monitoring.
● Follow up patients when an appointment is missed.
● Organize community-based activities.

References
Chapter 4. Screening for and diagnosis of hypertension
New cases of hypertension are identified through community-based screening, hospital-based screening and self-referral.

### 4.1 Community-based screening

Overall, screening for hypertension is widespread. The 2018 Behavioural Risk Factor Surveillance Survey (BRFSS) included 44,171 adults (men 21,584; women 22,587) aged 17–79 years and found that 68% (64% of men and 72% of women) reported having received a BP screening measurement at least once in the past one year from a health worker (1). The percentage of adults screened varied from 77% in the South Region to 59% in the Bangkok area. Among those screened, 17% reported being informed by a health worker that they had hypertension.

Community-based screening for hypertension and other NCD risk factors is included in the essential package of basic health-care services covered by UHC. Every year, community-based hypertension screening is organized at the subdistrict or village level by a team of nurses with support from community health volunteers. Most screening activities are organized in the first and second quarters of the fiscal year (from October to March). All adults aged ≥35 years in the catchment population who are not already diagnosed with hypertension are targeted for screening.

In 2019, a total of 17,301,873 adults were reported to have been screened for hypertension, representing 88% of the eligible target population (≥35 years and without pre-existing hypertension) (2). Most provinces met the 90% target expected for screening. Of all individuals screened, 74% were found to have a BP <130/80 mmHg, 22% had an SBP 130–139 mmHg and DBP 80–89 mmHg, while 4% had a BP ≥140/90 mmHg. All those with a BP of ≥130/80 mmHg were referred for further monitoring and confirmation of the diagnosis to the health centre or to the district hospital. However, due to the lack of a systematic follow-up mechanism, the majority of such patients do not report for follow up to confirm the diagnosis.

A nationwide study conducted in 2013 to assess the effectiveness of community-based screening found that coverage of screening for the population aged 15+ years was 55% (3). Among those screened, 29% were considered pre-hypertensive (BP ≥130/80 mmHg), and an additional 6% were considered “suspected cases of hypertension” (BP ≥140/90 mmHg). Among suspected cases of hypertension, less than half (38%) got a follow-up BP measurement within 60 days from the screening date and only 9.2% were diagnosed as having hypertension. Of the diagnosed cases, only one third (37%) received treatment within 6 months. The findings suggest that there is scope to improve the quality of community-based screening, institute effective mechanisms for follow up to complete referrals and reduce the gap between screening and diagnosis.

### 4.2 Hospital-based screening

Measurement of BP is a standard of care for all patients attending any MoPH hospital. In 2017, a total of 32,512,861 adults (61% of all adults) visited an MoPH health facility at least once during the year. Of these, 6% (1,864,602) did not have their blood pressure measured or
documented, 63% (20 685 731) had a normal BP (<140/90 mmHg) at every visit and 31% (9 962 528) had a raised BP (≥140/90 mmHg) on at least one occasion. Among those with a raised BP, 38% were already diagnosed and registered for care, whereas 27% were not yet diagnosed to have hypertension despite having had a raised BP on two or more visits (Fig. 4.1). These findings indicate that although BP measurement is a standard of care, there are many missed opportunities for diagnosis of hypertension.

**Fig. 4.1. Blood pressure of adult Thais visiting an MoPH health facility one or more times during 2017, Thailand**

![Distribution of outpatients aged >15 years, by blood pressure measurement, 2017 (N=32 512 861) vs Status of hypertension diagnosis among outpatients with raised blood pressure, 2017 (N=9 962 528)](image)

**Source:** Health Data Centre

### 4.3 Diagnosis of hypertension

In Thailand, only medical doctors are authorized to diagnose hypertension. The Thai Hypertension Society prescribes guidelines for diagnosis based on office BP measurement (4) (Fig. 4.2). However, physicians have limited awareness of these guidelines. Thus, due to the diverse knowledge and preference of individual physicians, there is much variability in the criteria used for the diagnosis of hypertension. Methods for measurement of BP range from unattended self-measurement to measurement by a nurse or doctor using a digital, aneroid or mercury sphygmomanometer. The correct procedures for measurement of BP are also not always followed, increasing the possibility of measurement errors.
**4.4 Newly diagnosed hypertension cases**

*4.4.1 Sources of newly diagnosed cases*

Newly diagnosed cases may be identified by both community screening and regular outpatient/inpatient services. Analysis of newly diagnosed hypertension patients during the fiscal year 2017 (showed that only 36% (292,518/822,945) of newly diagnosed patients had a record of at least a one-time BP measurement during community screening. Of 200,130 newly diagnosed patients with a documented record of BP during community screening within one year of diagnosis, 78% (155,800/200,130) had a normal BP recorded during the community screening (Pisitpayat N, MoPH, personal communication, September 2019). Two inferences can be drawn from these data: (i) a large number of patients who are newly diagnosed do not get screened, and (ii) a large number of patients may have “false-negative” BP readings during community
screening. There is a need for evaluation of the quality of community-based screening, given that considerable resources are used for this activity, which can be potentially useful for diagnosing patients with hypertension early.

According to the Rapid Hypertension Care Assessment Survey, of 1406 patients who were consecutively newly enrolled at 16 randomly selected health facilities, only 10% were referred from community surveys, whereas all others were diagnosed at various outpatient clinics in these health facilities (5).

### 4.4.2 Number of newly diagnosed cases

Each month, approximately 50,000–70,000 new cases are diagnosed with hypertension from all MoPH health facilities. Month-wise enrolment of new cases shows a cyclical/seasonal pattern mirroring community screening activities, with the highest numbers enrolled in the first and second quarters of the fiscal year (Fig. 4.3). During fiscal year 2017, among 822,945 newly diagnosed cases of hypertension, 58% were women and the mean age of newly diagnosed cases was 59.7 years.

**Fig. 4.3. Number of newly diagnosed patients with hypertension by month, 2015–2019, Thailand**

![Graph showing number of newly diagnosed patients with hypertension by month, 2015–2019, Thailand](image)

*Source: Health Data Centre*

### 4.4.3 Registered hypertension cases

After being diagnosed to have hypertension by a doctor, health facility staff registers the patients in the chronic follow-up folder of the "43 folder system". The practice of registration of hypertension varies across hospitals. Some health officers may register all patients from the catchment area, while others register only those patients in the catchment area whom they
are able to follow, or all patients whom they can follow up regardless of whether the patients are from the catchment area or not. However, health officers rarely register patients who live outside the catchment area because the national indicator monitors the results, e.g. registration, control rate in the catchment population only. Cumulatively, the number of registered patients has increased over time. Currently, 6.08 million patients are registered.

The Rapid Hypertension Care Assessment Survey found that among 1406 consecutively registered new patients during 2017, 56% were women. The mean age was 58±13 years. Only 8% were below 40 years, 48% between 40 and 60 years and 44% above 60 years of age. Risk factors were common – 10% were current smokers and 8.3% ex-smokers; a third of all newly registered patients were overweight and 13% were obese. The commonest comorbidities were dyslipidaemia (40%), diabetes (12%) and chronic kidney disease (5.5%). In all, 4.8% had prior CVD. The mean SBP at registration was 157.1±22.2 mmHg and the mean DBP was 90.2±15.3 mmHg. A significant (6.1%) proportion of patients presented with a hypertensive crisis (BP ≥180/110 mmHg) at registration.

References


Chapter 5. Treatment of hypertension
5.1 Guidelines for treatment

At public health facilities, treatment is provided according to the Thai clinical practice guideline (CPG) on hypertension prepared by the MoPH based on the Thai Hypertension Society guidelines. The most recent guidelines of the Thai Hypertension Society are summarized below (1). Some provinces and hospitals develop their own CPGs on hypertension using the Thai hypertension guidelines. Even then, the application and use of CPGs depends on the judgement of the physicians who provide care for hypertension. In the private sector, treatment is variable and is determined by the preferences of individual physicians.

**Fig. 5.1. Hypertension treatment guideline when considering average office blood pressure measurement**

<table>
<thead>
<tr>
<th>Blood Pressure Level</th>
<th>Grade 1 Hypertension</th>
<th>Grade 2 Hypertension</th>
<th>Grade 3 Hypertension</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>High normal blood pressure level</strong></td>
<td>130–139/85–89 mmHg</td>
<td>140–159/90–99 mmHg</td>
<td>≥180/110 mmHg</td>
</tr>
<tr>
<td>Recommend lifestyle modification</td>
<td>Recommend lifestyle modification</td>
<td>Recommend lifestyle modification</td>
<td></td>
</tr>
<tr>
<td>May consider BP medication in patients with CVD</td>
<td>Start BP medication if HT persists after monitoring for 3–6 months in low-risk patients, those who never had CVD, no renal disease and no TOD</td>
<td>Should start BP medication immediately after diagnosis of hypertension</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Try to lower BP to target level within 3 months</td>
<td></td>
</tr>
<tr>
<td>Grade 1 hypertension</td>
<td>140–159/90–99 mmHg</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grade 2 hypertension</td>
<td>160–179/100–109 mmHg</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grade 3 hypertension</td>
<td>≥180/110 mmHg</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

CVD: cardiovascular disease; TOD: target organ damage


As per the 2019 treatment guidelines, treatment should be started immediately if: (i) the patient has a BP ≥180/110 mmHg; or (ii) the patient is diagnosed with grade 2 hypertension (SBP 160–179 mmHg or DBP 100–109 mmHg); or (iii) if the patient has grade I hypertension (SBP 140–159 mmHg or DBP 90–99 mmHg) and has a high CVD risk >10% or diabetes, or renal disease or TOD or prior CVD. In cases with grade I hypertension without any risk factors, physicians use
a variable approach for initiating treatment. While some physicians offer a lifestyle modification trial for 3–6 months followed by medication if the BP is still high; others start treatment to avoid loss to follow up. Among patients with a high normal BP (SBP 130–139 mmHg or DBP 85–89 mmHg), physicians can consider starting medication among patients with a history of prior CVD. In addition to medication, lifestyle modification advice is given to all patients with hypertension.

The Thai hypertension treatment guidelines recommend the use of five main groups of BP medications in consideration with other comorbidities: ACE inhibitors (ACEIs), ARBs, beta-blockers, CCBs and diuretics (thiazides and thiazide-like diuretics such as chlorthalidone and indapamide) as per the selection guide (Annex 1).

5.2 Treatment practices

The Rapid Hypertension Care Assessment Survey among 1406 new patients indicates that the most common drugs used at the start of treatment at MoPH facilities were: CCBs (68%), followed by ACE inhibitors (36%) or ARBs (5.4%), beta-blockers (7.0%) and diuretics (6.4%) (2). Based on a calculation of the baseline cardiovascular (CV) risk from available records, the majority (56%) of new patients with hypertension were at moderate-to-high risk of CV events, requiring dual therapy from the start. However, as baseline CV risks were not usually assessed, less than half (45%) of the new patients were started on the correct regimen as recommended by the guidelines. While in 40% of patients the dose was adjusted when needed, clinical inertia was also present, as about 24% of patients did not receive any medication adjustment even when their BP did not reach the target. At the end of one year of therapy, 59% were receiving monotherapy and 41% two or more drugs.

According to an earlier published clinical audit conducted in 2007 among 1914 patients, more than half of the treated patients did not achieve target BP levels even though three quarters of treating physicians reported being aware of guidelines for hypertension management (3). Physicians’ responses to those who did not achieve target BP \( n=1000 \) were: follow up only without adjusting the medication (37%), added a new drug class (27%), increased drug dosage (26%), switched to another drug class (2%) and used more than one alternative (8%).

5.3 Adherence to treatment by patients

Counselling is an important part of hypertension care and given high importance by hospital authorities, especially at the primary care level. While patients wait their turn to see the doctor, nurses, counsellors and pharmacists provide group education on treatment adherence and healthy lifestyles. For patients with uncontrolled BP or those with risk factors, additional one-to-one counselling is given by nurses.

In a recently published study in Buengkan District of 408 participants on treatment with uncontrolled hypertension, 87% had low adherence as defined by the WHO guidelines, but having a caretaker, especially a daughter, was key to improving adherence (4).

Another cross-sectional study of 460 patients at a community hospital found that adherence to antihypertensive treatment was barely 40.4%. The odds of non-adherence were significantly higher among men (48%), older patients (48%) and those with perceived barriers to care (58%) (5).
5.4 Adverse events

The National Center of Pharmacovigilance of the Food and Drug Administration (FDA) with its network of 12 regional centres collects adverse drug reaction event reports annually from public and private health facilities. In 2017, 45,275 reports of 54,060 adverse events were submitted through spontaneous reporting by health facilities at all levels. Among antihypertensive drugs, amlodipine had the highest frequency of adverse events (3.7%), predominantly ankle/leg or other oedema (6). Trends in the past five years indicate that adverse events due to antihypertensive medicines have remained below 5% (Fig. 5.2). An earlier study in a large university hospital indicates that a quarter of the patients had cough associated with the administration of an ACE inhibitor (7).

Fig. 5.2. Trends in the reported frequency of adverse events of antihypertensive drugs, Thailand, 2013–2017


References

Chapter 6. Systems for monitoring
6.1 Overview of monitoring systems

The MoPH accords high priority to continuous monitoring to keep track of the progress made in meeting the targets for reducing the burden of NCDs. Technical departments of the MoPH have developed several guidelines for health facilities, including standards, indicators and quality assurance mechanisms to improve the quality of data and monitoring. The MoPH has also prioritized the use of technology to improve the efficiency of data collection and use, and has supported health facilities to build electronic systems for monitoring. For data collection and management, all health facilities up to the subdistrict level have the basic hardware such as computers and printers as well as software and access to continuous wifi. At provincial, regional and national levels, the MoPH has invested in creating the required infrastructure, including high-speed Internet and cloud technology to support data management and processing. Moreover, a web-based HDC dashboard has been developed for monitoring key performance indicators. In addition to equipment and technology, adequate human resources are available at different levels of the health system for data collection, management and analyses. Currently, physical records (paper-based system) are used in conjunction with electronic health records to monitor the control of hypertension.

6.2 Physical records

(i) Identity card: in 1985, the government introduced a unique 13-digit national identification number for each Thai citizen. An official identity card with this unique ID is issued to every Thai citizen aged between 7 and 70 years. The ID card is installed with a magnetic stripe and integrated circuit (IC) chip, which has the capacity to store up to 80 kilobytes of information. This unique ID is used for official documents and transactions, including house registration, taxation and access to health services under UHC. Within the health services, the identity card helps in maintaining longitudinal records of individual patients at every service encounter.

(ii) Family folder: all health centres maintain and update physical copies of family folders for every family in their catchment population (Fig. 6.1). Each family folder includes a list of all family members with their demographic and health status information and family genogram. It also includes a map with details of their house location. Family folders are managed and updated annually by health centre staff with the support of community health volunteers. Health centres have adequate space and facilities for storage of health records.
(iii) **Patient booklet:** most health facilities provide a hypertension booklet to each registered patient. Patients retain this booklet and bring it to the health facility at every visit. The booklet includes information on patient identification, contact, emergency contact as well as advice on following a healthier lifestyle. In addition, the booklet keeps a record of the patient’s BP readings, medicines dispensed and laboratory investigations, if any, at every visit. This helps patients to be aware of their own target BP control and their health status, and encourages self-care. The booklet also serves as a tool for health workers to communicate key advice and jointly review progress in BP control with patients (Fig. 6.2).
(iv) Referral form: patients with raised BP identified during community screening are referred to health facilities for further monitoring and confirmation of the diagnosis. A referral form is filled out in triplicate for each referred patient, with one copy given to the patient, one sent to the referred hospital and one kept with the referring health centre staff for further follow up.

6.3 Electronic health records

Electronic health records are available in Thailand to facilitate communication of patient data among different health-care professionals and health facilities, and to keep longitudinal records of patients’ health conditions and service encounters. Thailand has an indigenously built electronic health records system referred to as Health Data Centre or HDC. Using the unique ID number, health information data are generated for every individual at the point of service delivery (both in the community and in hospitals). This information is computerized using a standard data-based format called the “43 folder” system. All levels of health facilities under the MoPH are required to submit disaggregated, individualized data (raw data) to the provincial level in the “43 folder” system.

The standard dataset collected at each health centre includes three main types of information:

1. **Survey (demographic) folders/dataset:** information, including birth and death, address and other general information for each individual, is entered in survey/demographic folders. This information is updated manually in the family folders by public health staff and volunteers on an annual basis. New or updated information on an individual/family is expected to be updated electronically within one month.

2. **Health services folders/dataset:** this information is generated at every service encounter, both for outpatients and inpatients for various health programmes and is recorded/updated in 26 different folders. For example, BP is measured at every visit for every adult outpatient and recorded in the “service” folder. When a patient is diagnosed with hypertension, the patient is registered in the “chronic follow-up” folder. For every registered patient, information on medicines dispensed with dose, side-effects, BP reading and laboratory investigations, if any, is recorded at every visit in the “chronic follow-up” folder.

3. **Community-based service folders/dataset:** a total of 14 folders are used for collecting information on outreach health promotion and prevention services, including NCD screening, nutrition, immunization, etc. For example, individual data generated on BP and other risk factors collected during annual community-based screening are included in the community-based service folders.

At provincial health offices, a data manager with expertise in the IT field provides monitoring and oversight to support district and subdistrict staff in improving the completeness and quality of data. The data manager oversees all technology-related functions of health facilities in the province and helps to import, clean and analyse data in consultation with the NCD technical team, writes the code/program for retrieving the data and generating reports. From the provincial level, data are further transferred to the central HDC database for additional checking, cleaning, de-duplication, normalization and analyses. Finally, standard reports are generated as per the requirements of the technical teams and displayed on the online dashboard (Fig. 6.3) (1).
6.4 Quality and use of data

There are a number of qualitative issues with the HDC/43 folder system leading to limited trust in and use of the data. One problem is that different health facilities use different softwares/health information systems (HIS) provided by different vendors. These include Hospital and Experience (HOSxP), Java Health Center Information System (JHCIS), Hospital OS and Electronic Medical Record Software (EMR Soft). According to a national study, nearly 90% of health facilities had interoperability problems (2). Such incompatible systems have contributed to reducing the efficiency and quality of care and created difficulties in sharing electronic health records among health-care providers. In addition to software incompatibility problems, the shortage of staff, double burden of manual and electronic data entry in some health centres, and limited skills of staff leading to data entry and data coding errors all result in poor-quality data. Finally, the completeness and accuracy of the data are also affected when patients registered for care in one geographical area seek care from health facilities in a different geographical jurisdiction or when patients registered in an MoPH health facility decide to move to the private sector without simultaneous updation of records in the HDC. Currently, the 43 folder system represents data only from health facilities under the MoPH. There is no functional system for linking data from non-MoPH health facilities, i.e. university hospitals, military hospitals, private hospitals, clinics and pharmacies, where 30–40% patients seek care.

Efforts are ongoing to address data quality issues, including the development of standard operating procedures (SOPs) for hypertension data management from screening, diagnosis and
follow up to providing guidance for data entry, coding and usage. The SOPs will also address how to reduce the data entry burden by using technology (i.e. applications) and simplify data entry processes; identify a minimum dataset required from non-MoPH hospitals; and develop compatible interoperable systems for data exchange.

6.5 Monitoring indicators and targets

Key performance indicators are monitored at the national, regional, provincial and district levels as well as at individual health facilities within a district. Currently used indicators mainly focus on screening and treatment outcomes but not on coverage or quality of care. Selected examples of indicators used for monitoring hypertension care include the following:

1. Screening: percentage of the eligible target population undergoing community-based screening;
2. Case detection: number of new patients diagnosed with hypertension per 100 000 population;
3. Clinic-level BP control: percentage of registered patients with hypertension documented to achieve BP control (SBP <140 mmHg and DBP <90 mmHg) during the fiscal year;
4. Population-level BP control: diagnosis, treatment and control of hypertension at the population level through household surveys conducted every five years.

References

Chapter 7. Treatment outcomes
7.1 Population-level hypertension control

Successive rounds of NHESs conducted five-yearly provide the most robust data on BP control. At the population level, treatment coverage has almost doubled in the past decade from 23.6% in 2004 to 50% in 2014 (1). Yet, overall BP control is still only 30% (Fig. 1). Control is lower among men (22.3%) than women (37.2%), and is lowest in the youngest and oldest age groups (data not shown). BP control at the regional level varied from 17.5% in the South to 35.9% in Bangkok. Access to treatment and control is the poorest among younger men and women (Fig. 7.2 and 7.3) (1).

**Fig. 7.1.** Only 3 out of 10 persons with hypertension have a controlled blood pressure

![Fig. 7.1](image1)


**Fig. 7.2.** Diagnosis, treatment and control of hypertension by age group among men, Thailand, 2014

![Fig. 7.2](image2)

**Fig. 7.3.** Diagnosis, treatment and control of hypertension by age group among women, Thailand, 2014


### 7.2 Clinic-level hypertension control

The MoPH has set a target to achieve a clinic-level BP control of 50%, as defined by SBP <140 mmHg and DBP <90 mmHg at the last two consecutive readings within the fiscal year (October to September). According to this definition, clinic-level BP control among all registered patients with hypertension at MoPH facilities increased from 21% in 2014 to 45% in 2019 (2). Based on a less rigorous definition (SBP <140 mmHg and DBP <90 mmHg at the last visit only), hypertension control was 59% (range: 51–67%) in 2019.

The MedResNet (3) with support from the National Health Security Office (NHSO) conducts repeated nationwide cross-sectional surveys to assess the quality of care among patients registered for hypertension care at MoPH and non-MoPH health facilities. As per the latest survey in 2018, the BP control rate was highest in the MoPH community and primary health-promoting hospitals – these facilities are in the public sector at district and subdistrict levels and thus most accessible by patients (Fig. 7.4). Private health facilities had a lower BP control rate. Another study in the private sector found BP control to be 48% at the end of 2 years after enrolment (4).
The Rapid Hypertension Care Assessment Survey among 1406 consecutively enrolled patients at 16 randomly selected health facilities found that only 53% had their BP controlled (BP <140/90 mmHg) at 6 months after initiation of treatment, 29% did not still have their blood pressure controlled, and 18% were either lost or yet to follow up at the health facility (5).

In a large nationally representative study, lack of BP control was significantly associated with being male, younger, overweight and having comorbidities, particularly diabetes and dyslipidaemia (6). In the same study, BP control was highest in primary care facilities (health centres) than at other facilities.

A study of patients undergoing treatment at MoPH facilities in two rural communities (n=406) found that the overall BP control was 46%, higher among women (48%) than men (40%) (7). BP control has been found to be higher with the use of home BP monitoring (8,9).
7.3 Clinic-level frequency of complications

Annual screening is undertaken for all patients with hypertension undergoing treatment (10). Trends in complications among such patients are shown in Fig. 7.5.

**Fig. 7.5. Frequency of complications among patients with hypertension, 2012–2018, Thailand**

![Graph showing frequency of complications among patients with hypertension, 2012–2018, Thailand.](image)

**Source:** National Health Security Office, 2012–2018

**References**


Chapter 8. Best practices and success factors
A strong primary health care system provides a solid foundation to scale up and deliver hypertension care nationwide. Excellent care infrastructure in urban and rural areas with functional referral linkages, availability of well-trained staff at all levels, with medicines and investigations covered under the UCS are important factors for successfully providing hypertension care all over Thailand. The following best practices from Thailand deserve mention.

### 8.1 National Strategic Technical Advisory Group on Hypertension

In March 2018, the MoPH established a national Strategic Technical Advisory Group (STAG) on hypertension, reflecting the high commitment and priority accorded to controlling hypertension. The terms of reference of the STAG are as follows:

1. to provide oversight and strategic direction for hypertension control in Thailand;
2. to periodically review programme performance and identify actions to improve hypertension control, including training, data system and evidence generation;
3. to take stock of new developments and make recommendations for applying evidence-based best practices to improve hypertension control;
4. to identify and nominate well-performing health facilities for annual awards;
5. to report progress on hypertension control to the national NCD multisectoral committee chaired by the health minister.

The STAG is chaired by the Director-General of the Department of Disease Control and members include senior policy-makers, programme managers from the MoPH, epidemiologists, primary health care experts, clinicians, the Thai Hypertension Society and Field Epidemiology Training Programme (FETP) trainees. The Division of NCD, MoPH and WHO Country Office serve as the co-secretariat.

The STAG meets once every three months with an agenda to discuss and improve four priority areas of work: (i) public awareness of hypertension; (ii) diagnosis rate; (iii) treatment practices; and (iv) quality and use of data.

Key achievements of the STAG to date include the launch of a nationwide social media campaign to create public awareness; establishment of 100 kiosks for BP self-measurement at public places in Bangkok in collaboration with the private sector and the Ministry of Interior; improved analyses of data; a pilot project to improve hospital-based screening for hypertension; and greater engagement of key partners within and outside the MoPH, including the FETP, Thai Hypertension Society and academic experts in hypertension.

### 8.2 Unique patient ID with longitudinal record for every patient

The unique identification card that every Thai citizen possesses facilitates access to government services and longitudinal follow up. The 13-digit number is assigned by the Ministry of Interior...
to each citizen aged 7–70 years to serve various purposes, including taxation, insurance covered, health services, house registration, etc. All patients with hypertension are registered within the government and private health-care system using this unique number. The key advantages of this unique ID include the following:

(i) ability to maintain an individual electronic health record for every patient, with access to historical information;

(ii) better management of data, including de-duplication of records to avoid double counting of patients who access care at multiple facilities;

(iii) easy sharing and exchange of patient information among different health providers in the same facility (doctor, nurse, pharmacist) as well as among providers across different MoPH health facilities anywhere in the country;

(iv) allows longitudinal follow up and monitoring of treatment outcomes for individuals and cohorts of patients, and provides opportunities for operations research.

8.3 Measurement of blood pressure as a standard of care

According to the latest BRFSS, 68% of Thais reported having had their BP measured in the past year. The high coverage of BP measurement can be attributed to opportunistic screening of every outpatient visiting a health facility, regardless of the presenting symptoms. Services are well organized at health facilities, with a systematic flow of patients, such that measurement of BP is unlikely to be missed. Thus, in 2018, 85% of adult outpatients had a documented valid BP reading. Availability of automated self-measurement BP devices with an attached printer at almost all MoPH facilities has made it possible to screen a large volume of patients. Moreover, annual community-based screening is also done as part of preventive and promotive services. In 2019, 88% of the eligible population reported that they had been screened at the community level.

8.4 Patient-centric care closer to home

Approximately 80% of patients are treated either at health centres or at district hospitals – these facilities are within a reasonable distance from most communities. According to the Rapid Hypertension Care Assessment Survey, the median distance from home to the health facility was 7 km (range: 3–15 km). In the same survey, patients expressed a high level of satisfaction with the health system (1). Health centres provide one-stop services with collection of blood for investigations and dispensing of medicines close to the community. When patients cannot visit the health centre, then health workers conduct home visits to follow up and provide medicines at the patient’s home.
Patient A was detected to have raised BP (SBP 160 mmHg) during the annual community BP screening by a village health volunteer in Bang-Rakam District of Phitsanulok Province, Thailand. He was referred to the District Hospital for further monitoring. After confirmation of the diagnosis, Patient A was started on antihypertensive treatment. He was later referred to the health centre, Baan Krub-Puang Health Promoting Hospital, which is walking distance from his home. He receives a free three-month supply of medication under the UCS. He has also adjusted his lifestyle to maintain a healthy weight and reduce salt consumption.

### 8.5 Regular supply of drugs and 3-month prescription

Hypertension is a chronic lifelong condition. Most patients in Thailand receive medicines for 1–3 months at a time, depending on the status of BP control. According to the results of the Rapid Hypertension Care Assessment Survey, the average follow-up time for refills for patients with good BP control varied from 8 to 24 weeks for provincial hospitals and 4 to 12 weeks for district hospitals. Drugs are rarely out of stock because hospitals are allowed to do local procurement. The electronic drug inventory control system is standardized and helps hospitals to keep buffer stock. Each health facility has sufficient storage space for maintaining the required buffer stock. All medicines are of high quality and provided in blister packs. Receiving a drug supply for 3 months is of great convenience to patients as it avoids repeated visits and also helps reduce congestion at health facilities.\(^1\)

### 8.6 Committed team of health workers

At the primary care level in district hospitals, care is provided by a team of health workers. This includes a clinical nurse, doctor, pharmacist, laboratory technician and record keeper. Each member has a specific role. Usually the clinical nurse is the case manager or in charge of managing the clinic, whereas the doctor focuses on prescribing medication. The pharmacist helps in counselling for adherence and dispensing medicines. Data recorders are responsible for updating electronic records, preparing reports and providing patient appointments. At health centres, care is provided mostly by nurses and public health workers under the supervision of the visiting physician from the attached district hospital.
Ms Suda Khamnurak is a registered clinical nurse and has been working in the area of NCDs in Kong Rha Hospital for the past 14 years. As a case manager, Ms Suda is responsible for organizing and managing the smooth delivery of hypertension care at the district hospital. In addition to improving continuing follow up and care, she has strengthened outreach services to communities in the catchment area in close collaboration with health centre staff. She also supports capacity-building for the staff at the health centres and community health volunteers, and undertakes home visits as needed.

8.7 A culture of evidence-based programme and policy development in close collaboration with the FETP

In 2017, the FETP of Thailand included a dedicated track on CVD. One to two new fellows are selected each year. FETP fellows guided by mentors have helped to analyse HDC data, and have undertaken situation analyses and operations research projects to provide evidence for programme improvement. FETP fellows participate regularly in STAG meetings, where they present the results of their hypertension research projects. This has added huge value to the programme and reinforced a culture of examining evidence for decisions and actions. Importantly, the programme provides an opportunity for young FETP fellows to identify suitable research projects that are relevant to programmatic needs. This is truly “learning by service” and a win–win strategy for both the national hypertension programme and for health workforce development in Thailand.

Reference

Chapter 9. Challenges in hypertension control
9.1 Low rate of diagnosis

Hypertension care was included in the UHC benefit package in 2002, yet almost half of those with hypertension remained undiagnosed in 2015. Several factors may be contributing to the low rate of diagnosis. Even though utilization of the health services is high and screening is conducted extensively in communities and at health facilities, the quality of screening may be suboptimal. Lack of a conducive environment for BP measurement in crowded, noisy outpatient departments or faulty equipment may be some of the factors resulting in inaccurate measurement and poor quality of screening. Patient-related factors may also contribute to the low rate of diagnosis. Individuals identified with raised BP during screening often do not return for repeat BP measurement – this could be due to a low risk perception of a high reading or health system barriers such as inconvenient timings and long patient queues.

Physician-related factors also play a key role in the low rate of diagnosis. Currently, there is no systematic continuing medical education for primary care physicians on the diagnosis, treatment and monitoring of hypertension. Thus, primary care physicians are often unaware of new guidelines for diagnosis and treatment. In addition, there is also some hesitation among physicians to diagnose hypertension based on clinic BP measurement due to the possibility of white coat hypertension (WCH), where the BP is raised in the clinic but is normal when measured at home. The prevalence of WCH greatly varies and is highest in individuals with stage I hypertension (SBP 140–159 mmHg or DBP 90–99 mmHg) (1). There are a limited number of well-designed studies on WCH in Thailand. While one recent unpublished study indicates that a quarter of patients with raised BP measured at clinic level had WCH, most of those with WCH tended to have lower mean SBP and DBP (Sakolwat M et al. Hypertension subtypes among Thai hypertensives: an analyses of telehealth assisted instrument in home blood pressure monitoring [unpublished]). The same study reported the prevalence of masked hypertension to be 7%, i.e. the BP is normal when measured at the clinic and raised when measured at home.

Given that in Thailand half of those with hypertension remain undiagnosed, it is important to use appropriate strategies to deal with WCH and masked hypertension. The apprehension of WCH should not become a reason for delaying or denying diagnosis and treatment. Instead, strategies are needed to strengthen the quality of screening and diagnosis by improving the accuracy of measurement, offering home BP measurement to selected patients, and removing patient barriers to office BP measurement.

The MoPH is introducing several strategies to close the gap between the expected number of cases of hypertension and the number diagnosed. To further increase access to BP measurement in urban populations, 100 automated BP monitoring devices with national ID card readers have been procured. These will be placed at government offices and public places in and around the Bangkok area. In addition, BP measurement devices are being provided to health facilities in every province to increase access to home BP measurement as an adjunct to clinic BP measurement. Additional research is needed to identify locally feasible interventions to improve the hypertension diagnosis rate.
9.2 Treatment inertia

Most health-care workers in Thailand use the treatment guidelines produced by the Thai Hypertension Society. The most recent guidelines released in April 2019 provide a menu of options for treatment based on age and comorbidities. Currently, no simple drug- and dose-specific protocol for treatment is available for use by primary care physicians and nurses. Moreover, there is no regular and institutionalized system for clinical auditing to check on adherence to treatment guidelines. Earlier clinical audits have found that lack of adherence to treatment guidelines is common. Key problems observed include use of monotherapy when dual therapy was needed and failure to increase the dose when needed. Thus, the BP control rate among treated patients is suboptimal. Available evidence shows that a simple treatment protocol is key to improving BP control (2). Introducing a simple, step-by-step drug- and dose-specific treatment protocol consistent with the national guidelines and backed by training of health workers and periodic clinical audits can greatly help in simplifying treatment, easing inventory control, facilitating team-based care, reducing treatment inertia and thus improving BP control. Introduction of fixed-dose combination (FDC) pills is also an important means of reducing treatment inertia and improving BP control, as most patients require two or more drugs to achieve target BP control (3). FDC pills help to improve patient adherence, and can improve BP control without increasing the side-effects (4). WHO has recently added four FDC pills\(^1\) in its essential list of medicines (5,6).

9.3 Health systems barriers to hypertension care

Although health services are well organized, one of the key challenges at health facilities is overcrowding and long patient waiting times. The critical path for delay is the waiting time to see the doctor and waiting time to collect medicines. According to the Rapid Hypertension Care Assessment Survey in 2018, patients spent on average 3–4 hours in the hospital. If current efforts to improve the diagnosis rate become successful, the patient load will only increase in future. The recently published HOPE 4 trial shows that a model of hypertension care led by non-physician health workers with supervision from physicians is feasible, effective and pragmatic, and can substantially improve BP control and reduce CVD risk (7). Therefore, the MoPH should consider a policy of allowing non-physician health workers, including nurses and pharmacists, to prescribe/adjust the dose of medication for patients with hypertension.

Health systems barriers are particularly pronounced for the working population, who find it inconvenient to attend health facilities during working hours. For approximately 15 million workers in the formal sector, the annual health examination, which includes BP measurement, is already included in the benefit package under the SSS. For this group, access to a diagnosis of hypertension can easily be strengthened by putting in place a “one-stop service” for screening, diagnosis, treatment and monitoring. For workers in the informal sector, innovative models should be developed, including engagement of pharmacies, drug stores and other community resources.

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1 (i) Lisinopril and amlodipine; (ii) lisinopril and hydrochlorothiazide; (iii) telmisartan and amlodipine; (iv) telmisartan and hydrochlorothiazide.
9.4 Suboptimal collaboration with the non-MoPH and private sectors

Approximately 30–40% of patients are treated within non-MoPH health facilities such as university hospitals and the private sector. There is limited knowledge about the volume of care, treatment practices and treatment outcomes of patients who receive treatment in the non-MoPH and private sectors. It is also possible that some patients from the public sector shift to the private sector but the volume and pattern of this is not known. There is currently no regulation requiring the private sector to report on services provided in the NCD area to the MoPH. Collaboration for data exchange between the private and public sectors is at a nascent stage and deterred by problems related to differences in data interoperability systems. One public military hospital in Bangkok has developed the “Bangkok e-Referral Healthcare System” for transfer of data and patient referral.

There is a need to conduct research to map local providers who are outside the MoPH system. Further, it will be useful to characterize patients in the private sector as well as treatment and monitoring practices of providers. Efforts to collaborate with non-MOPH health facilities (i.e. university hospitals, military hospitals, private hospitals and clinics) to share a minimum set of data would help the MoPH to better monitor overall hypertension care in the country.

References

Chapter 10. The way forward
Hypertension is among the leading causes of disease burden and mortality in Thailand. It accounts for two thirds of deaths from stroke and half the deaths from IHD. It also imposes a huge economic burden on Thai society in terms of direct medical care costs due to acute care and prolonged costs to families for care of the disabled, as well as indirect costs from lost productivity. Thailand has a nationally scaled-up hypertension programme rooted within its strong primary health care infrastructure. The programme can boast of many best practices, including universal screening for hypertension, free and regular supply of medicines, patient-centred care, continuity of care and electronic health records for every patient, updated longitudinally.

Despite a strong health system and numerous unique best practices in hypertension care, population-level control of BP is barely 30%. While this figure is better than in most low- and middle-income countries, it is far below the BP control rates in developed countries. For example, Canada has achieved BP control of 68% at the population level, which has resulted in a dramatic reduction in mortality from myocardial infarction and stroke over the past two decades (1, 2). Specific initiatives in Canada that contributed to this success included: development and implementation of national strategies for hypertension control with oversight by a steering committee comprising representatives from primary health care and other stakeholders; development of hypertension knowledge translation programmes for health professionals and the public; active involvement of health volunteers, health-care professional and scientific organizations; and implementation of a research programme to assess the impact and guide interventions.

To further improve the hypertension control rate in Thailand, existing programmatic gaps such as diagnostic and treatment inertia need to be addressed. In addition, new and bold measures must be adopted based on emerging evidence-based global best practices. WHO HEARTS, the technical package for improving hypertension control within primary health care services, recommends five key strategies: (i) a simple drug- and dose-specific treatment protocol; (ii) regular supply of quality-assured antihypertensive medicines; (iii) team-based care; (iv) patient-centred care; and (v) functioning systems for monitoring (3,4).

Treatment of hypertension can save more lives than any other adult health-care intervention (5–7) and can help Thailand achieve the global NCD target of reducing premature mortality from NCDs by 25% by 2025. Going forward, Thailand can strive to advance from a relatively good hypertension care programme to among the best hypertension care programmes globally by considering the following actions:

1. Improve the quality of BP screening
   a. Train health workers to accurately measure the BP and ensure that the prescribed procedures are followed during measurement.
   b. Ensure that BP measurement devices are regularly calibrated.
   c. Include screening of relatives of outpatients attending health facilities through a fast-track mode (without having to wait in queue).
2. Reduce the gaps between screening, diagnosis and registration
   a. Institute locally feasible mechanisms to follow up patients found to have a raised BP reading during screening. Patients who report to a health facility for repeat BP monitoring should be fast-tracked to avoid long patient waiting times.
   b. Establish locally appropriate linkages and SOPs to ensure that patients diagnosed with hypertension are registered on the same day to facilitate continuity of care and long-term monitoring.

3. Strengthen treatment practices
   a. Develop and use a simple treatment protocol that lists specific drugs and dosages, and can be used at the primary health centre level. Each province/jurisdiction area may develop its own treatment protocol in consultation with the MoPH.
   b. Allow clinical nurses to prescribe and adjust the dose of drugs as per the agreed treatment protocol.
   c. To improve treatment adherence, include FDC pills in the national essential medicines list and allow hospitals to procure these drugs as part of the UCS.
   d. Undertake periodic clinical audits and conduct refresher training of health workers to improve adherence to the treatment protocol.

4. Reduce patient barriers to accessing hypertension care
   a. Map local resources and engage with available health providers such as private practitioners, pharmacies and others to increase access to screening, diagnosis and treatment of hypertension for the working population.
   b. Expand interventions for screening, diagnosis and management of hypertension in workplace settings.

5. Proactively engage with the non-MoPH and private sector
   a. Train private practitioners in the Thai hypertension diagnosis and treatment guidelines and disseminate a simple treatment protocol to improve the effectiveness of treatment in the private sector.
   b. Address data interoperability issues to capture a minimum set of data from the private sector on hypertension and other NCDs.
   c. Make reporting on hypertension obligatory for non-MoPH and private sector hospitals.

6. Analyse and use available information to drive progress
   a. Develop local-level data dashboards and provide feedback to drive programmatic improvement.
   b. Identify and reward health facilities based on performance.
   c. Continuously improve the quality of HDC data.
d. Include BP measurement in the BRFSS to obtain data on population-level hypertension prevalence and treatment coverage more frequently than currently available (every five years).

7. Undertake implementation/operational research to continuously make the programme more effective and efficient. Examples of priority operational research include the following:

a. Evaluate the quality of screening programmes, including the quality of BP measurement devices and adherence to the recommended processes for BP measurement.

b. Ascertaining the barriers that prevent patients from returning for follow-up BP measurement after screening; develop and test locally suitable interventions to increase the rate of follow up among screened patients.

c. Characterize patients who are lost to treatment.

d. Investigate fatal and non-fatal CVD events to learn from health system failures and prevent such events.

e. Develop and test models for engaging with the private sector.

f. Develop and test interventions for increasing access to hypertension screening, diagnosis, treatment and follow up among the working population in formal and informal settings.

References


Annex
Blood pressure medication guideline

<table>
<thead>
<tr>
<th>Recommendation</th>
<th>Strength of recommendation</th>
<th>Quality of evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Should select medication to start treatment of hypertension from the 5 main groups, i.e. angiotensin-converting enzyme inhibitors (ACEIs), angiotensin-receptor blockers (ARBs), beta-blockers, calcium-channel blockers (CCBs), and diuretics (thiazides and thiazide-like diuretics)</td>
<td>I</td>
<td>A</td>
</tr>
<tr>
<td>Should start with 2 types of medications for most patients. May select renin–angiotensin system blockers (ACEIs or ARBs) to be taken with diuretics or CCBs; the combination of medication groups to be selected as appropriate. For weak patients, patients with relatively low starting BP (140–149/90–99 mmHg) and low-risk patients, only one type of medication should be started initially.</td>
<td>I</td>
<td>A</td>
</tr>
<tr>
<td>Should select a starting medication that is a combination of 2 types in one pill (fixed-dose combination)</td>
<td>I</td>
<td>B</td>
</tr>
<tr>
<td>Should use 3 types of BP medication if 2 types cannot control the BP. One of the 3 types should be a diuretic (thiazides or thiazide-like diuretics)</td>
<td>I</td>
<td>A</td>
</tr>
<tr>
<td>Should add spironolactone or beta-blocker or alpha-blocker, one type at a time in that order, if 3 types of medication cannot control BP and if none of these 3 types have been taken earlier</td>
<td>I</td>
<td>B</td>
</tr>
<tr>
<td>Should not coadminister ACEIs with ARBs</td>
<td>III</td>
<td>A</td>
</tr>
</tbody>
</table>


*a Strength of recommendation*

The strength of a recommendation indicates the extent to which one can be confident that adherence to the recommendation will do more good than harm.

Level I: The recommendation “should be practised” because the available evidence is highly reliable, beneficial to patients and worthwhile.
Level IIa The recommendation “could be practised” because the available evidence is moderately reliable, likely to be beneficial to patients and probably worthwhile.

Level IIb The recommendation “may be practised” because, although the available evidence is not reliable enough, adequate proof of benefit to patients is lacking and it is probably not worthwhile, it will not cause any harm to them.

Level III The recommendation “should not be practised” or “must not be practised” because it is not beneficial and will probably cause harm to patients.

b Quality of evidence

The quality of evidence is defined as the confidence that the reported estimates of effect are adequate to support a specific recommendation. The higher the quality of evidence, the more likely a strong recommendation can be made.

A The available evidence is from various high-quality randomized controlled trials or from meta-analyses.

B The available evidence is from at least one high-quality randomized controlled trial or from a large-scale non-randomized study with a definitive outcome on advantages or disadvantages.

C The available evidence is from other types of studies – a high-quality study, a retrospective descriptive study, a registry study or agreement from a group of medical specialists based on clinical experience.
This report highlights the burden of cardiovascular disease and describes how the Royal Government of Thailand provides hypertension care within its public health system. It describes facilities for the screening, diagnosis, treatment and monitoring of hypertension and identifies best practices that have led to a high coverage of hypertension care. Current programmatic challenges and priority actions for further improving the coverage and quality of hypertension care are also discussed.