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Physicians' awareness and practice of home blood pressure measurement in Indonesia: Asia home blood pressure monitoring survey 2020

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ABSTRACT

BACKGROUND

Hypertension is a significant mortality risk factor. The knowledge and practice among physicians of hypertension management and home blood pressure monitoring (HBPM) in blood pressure control is important. We aimed to investigate the awareness and practice of HBPM among physicians in Indonesia after publishing of the local 2019 HBPM guidelines.

METHODS

This was a cross-sectional study involving 611 physicians in Indonesia that was conducted between February and October 2020. The questionnaire covered awareness, knowledge, and practice of HBPM.

RESULTS

A total of 330 male physicians (54.0%) aged 20-49 years participated in the survey. More than half were specialists (51.6%) and recommended HBPM to their patients with hypertension (89.0%). The awareness of HBPM benefits was substantial among the physicians; however, the knowledge of the home blood pressure (HBP) reference values of was low (7.9%). Around 54% of the respondents thought that the barriers to low recognition of HBPM are lack of HBPM guidelines or lack of understanding of HBPM among physicians. A considerable percentage provided instruction on HBPM that aligned with the local guidelines, but between 7.5-29.5% gave no instruction on HBPM.

CONCLUSION

Most physicians recommend HBPM, but there is still a lack of knowledge and attitude toward HBPM. In Indonesia, local HBPM guidelines were published in 2019, but have not yet sufficiently penetrated the country, therefore robust dissemination of the published HBPM guidelines is still needed. For efficient utilization of HBPM by physicians in clinical practice, developing user-friendly educational tools such as physicians' pocket guide on HBPM instructions is essential.

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INTRODUCTION

In Indonesia, 37% of total deaths are caused by cardiovascular diseases (CVDs). Especially stroke is a serious problem in the country, causing 21% of deaths, whereas 9% of deaths is due to coronary heart disease (CHD).⁽¹⁾ High blood pressure (BP) is a known prominent risk factor for CVDs. The Indonesia family life survey (IFLS) conducted in 2016 estimated high BP as an attributable factor to 37% of strokes in males and 39% in females, while accounting for 20% of CHD in males and 25% in females.⁽²⁾ The prevalence of hypertension in Indonesia is estimated at around 34%, which makes it one of the health burdens affecting the country economically and socially.⁽³⁾ Measured BP is the indicator of an individual's BP value and diagnosis of hypertension. However, according to the IFLS national survey, 70% of participants answered to have measured their own BP for the very first time making the screening for hypertension in the country still limited.⁽⁴⁾ One key aspect in preventing CVDs is keeping BP under control; however, the Indonesia Family Life Survey (IFLS) national study revealed that the awareness of hypertension was 37% and the BP control rate was only 25% among hypertensive patients in Indonesia. Another study conducted in Indonesia by the AsiaBP@Home study group showed that the BP control rate among 202 hypertensive patients was 23% and sustained uncontrolled BP was 54%, while white-coat hypertension was 13% and masked hypertension was 9%, using both clinic BP (CBP) and 7-day home BP (HBP).⁽⁵⁾

The available evidence on BP control is based on routine CBP; nevertheless, this index has the limitation of assessing BP only on one occasion. Additionally, recent evidence shows the

superiority of out-of-office BP measurement, more specifically home blood pressure monitoring (HBPM), in identifying white-coat and masked hypertension, improving the medications adherence and patient treatment compliance, and hypertension management.⁽⁶⁻⁹⁾

The Indonesian hypertension guidelines recommend HBPM for its affordability and practicality in comparison to ambulatory blood pressure monitoring (ABPM), which allows for multiple blood pressure measurements of BP at the convenience of the patient's own environment and as confirmatory measurement of CBP in the diagnosis and treatment of hypertension. A national survey in 2019 targeting general practitioners and specialists revealed that most healthcare practitioners recommend HBPM in hypertension management; however, the knowledge of the HBPM technique among physicians is still lacking.⁽¹⁰⁾ To help implement HBPM in clinical practice in Indonesia, the Indonesian Society of Hypertension (InaSH) established HBPM guidelines for physicians in 2019, which focused on key aspects of HBPM including clear HBPM technique and clinical benefits.⁽¹¹⁾

The physicians' awareness and the usability of the HBPM guidelines in their practice are important features of managing hypertension. Thus far, several studies have investigated the knowledge, attitude, and practice of HBPM among physicians in relation to hypertension guidelines. A paper by Xavier et al.⁽¹²⁾ reported that among French general practitioners (GP) 94.5% use HBPM for diagnosis and 92.5% for monitoring hypertension. A recent survey conducted in 2020 among 11 Asia Pacific countries, including Indonesia, showed that the recommendation of HBPM by physicians in Asia

is high (95.9%) - nevertheless, the knowledge and instruction of HBPM were low (at 22.4% and 54.1%, respectively).⁽¹³⁾ In the survey, almost half the physicians in Asia attributed the barriers to the dissemination of HBPM to lack of understanding of HBPM and lack of HBPM guidelines. Indonesia published its local HBPM guidelines in 2019; however, the results of the survey show low understanding of HBPM, which could be related to low dissemination of the local guidelines. As part of the same survey, we aimed to scale the dissemination of HBPM guidelines and assess the knowledge, attitude, and practice of HBPM after the dissemination of the local HBPM guidelines and to explore the barriers to dissemination of HBPM among physicians and patients in Indonesia.

METHODS

Research design

This exploratory survey was an observational cross-sectional study conducted in Jakarta, Indonesia, between February and October 2020 as a part of the Asia HBPM Survey 2020. The overall results of the Asia HBPM 2020 survey which was conducted in 11 Asian countries (China, India, Indonesia, Japan, Malaysia, the Philippines, Singapore, South Korea, Taiwan, Thailand, and Vietnam) were recently published.⁽¹³⁾

Research subjects

The participants eligible for the survey were: 1) healthcare professionals (HCP) and 2) living in Indonesia. The primary sample size target was 1000 HCP; nevertheless, due to COVID-19 pandemic, the recruited sample size was 792. To focus on the awareness of HBPM by physicians only (including general practitioners and specialist), nurses and other HCP were excluded. Physicians with missing data from the characteristics section of the questionnaire (questions 1-5) were excluded from the analyses leading to the final sample size being 611.

Data collection

The survey was distributed using an online panel through SurveyMonkey and an offline platform during a national annual scientific meeting (Indonesian Society of Hypertension conference). The questionnaire was composed of 37 questions and sub-questions which covered the respondents' awareness, knowledge, and practice of HBPM, including questions on the recommendations of HBPM and device type, barriers to HBPM recognition, benefits of HBPM, instructions regarding HBP measurement, and knowledge of diagnostic BP reference value for hypertension (Supplementary Material 1). The key elements of HBPM from the survey were compared with the recommendations in the 2019 local HBPM guidelines. Additionally, the physicians' perceptions of their patients' ownership of HBPM device, measuring of HBP, and recognition of HBPM and the barriers to recognition among their patients were explored through the survey questions.

Statistical analysis

The statistical analysis was done as descriptive statistics for the proportions of respondents per question expressed as percentages only. All analyses were performed on JMP statistical software, version 15.2.1 (SAS Institute, Cary, NC).

Ethical clearance

Informed consent was obtained directly from the participants. This study was approved by and received ethical clearance from the School of Medicine and Health Sciences, Atma Jaya Catholic University of Indonesia (No.12/05/KEP-FKUAJ/2017).

RESULTS

A total of 611 respondents participated in this study. There were more males than females among the participants (54.0% males vs 41.9% females), and the age proportion fell gradually

from the participants aged 20 years to those 70 years of age (Table 1). Nearly 52% of the physicians were specialists. The majority of the physicians worked at hospitals (76.3%) and on average they managed 46 hypertension patients per week.

Regarding the physicians' knowledge, they were asked about their awareness of HBPM benefits and their knowledge of hypertension reference values evaluated by CBP and HBP. The physicians' knowledge of HBPM benefits was substantial for hypertension management (69.6%), the diagnosis of white-coat hypertension (59.6%), and masked hypertension (55.3%), but less than 50% of the physicians knew HBPM as a tool to evaluate anti-hypertensive medication efficacy

Table 1. Distribution of physicians' characteristics (n=611)

Characteristics	n (%)	
Gender		
Male	330	(54.0)
Female	256	(41.9)
Age (years)		
20-29	154	(25.2)
30-39	137	(22.4)
40-49	114	(18.7)
50-59	106	(17.3)
60-69	56	(9.2)
≥70	41	(6.7)
No answer	3	(0.5)
Specialty		
General practitioner (GP)	280	(45.8)
Specialist	315	(51.6)
Other specialty	6	(1.0)
No answer	10	(1.6)
Specialist		
Cardiologist	67	(21.3)
Internist	6	(1.9)
Nephrologist	13	(4.1)
Neurologist	79	(25.1)
Other	0	(0.0)
No answer	150	(47.6)
Workplace		
Hospital	466	(76.3)
Clinic	114	(18.6)
Other	22	(3.6)
No answer	9	(1.5)
Number of hypertension patients/week, n	45.6	

Values are expressed as n (%) unless otherwise stated

Table 2. Awareness of hypertension reference value among physicians in Indonesia (n=611)

	n (%)	
CBP (mm/Hg)		
130/80	57	(9.3)
135/85	7	(1.2)
140/90	278	(45.5)
Other	182	(29.8)
No answer	87	(14.2)
HBP (mm Hg)		
130/80	66	(10.8)
135/85	48	(7.9)
140/90	211	(34.5)
Other	202	(33.1)
No answer	84	(13.7)
Home Systolic BP < Clinic Systolic BP	149	(24.4)
Home Systolic BP = Clinic Systolic BP	329	(53.9)
Home Systolic BP > Clinic Systolic BP	39	(6.4)

Values are expressed as n (%); CBP: clinic blood pressure; HBP: home blood pressure; BP: blood pressure

(Figure 1). Moreover, only 34.9% of physicians utilize HBPM to evaluate their patients' CVD risk. In respect of the knowledge of hypertension diagnostic reference values of 140/90 mmHg for CBP and 135/85 mmHg for HBP, 45.5% of the physicians knew the reference value for CBP, while only 7.9% answered the correct reference value for HBP (Table 2). A considerable 53.9% of the physicians answered that systolic HBP and systolic CBP are of the same value, whereas less than a quarter of the respondents (24.4%) answered that the value of HBP is less than that of CBP.

Among the respondents, 89.0% recommend HBPM to their hypertensive patients, which shows high acceptance of HBPM among the responding physicians. However, out of 498 physicians who manage hypertension patients, the perceived percentage of patients that own a HBPM device was 22.3%, whereas only 23.4% of patients measure their HBP (Figure 2). The attitude of the other physicians in the country was investigated by asking the respondents about the recognition level of HBPM among physicians in Indonesia and the barriers to the dissemination of HBPM. Among the respondents, 36.5% think HBPM is well known by other physicians in the

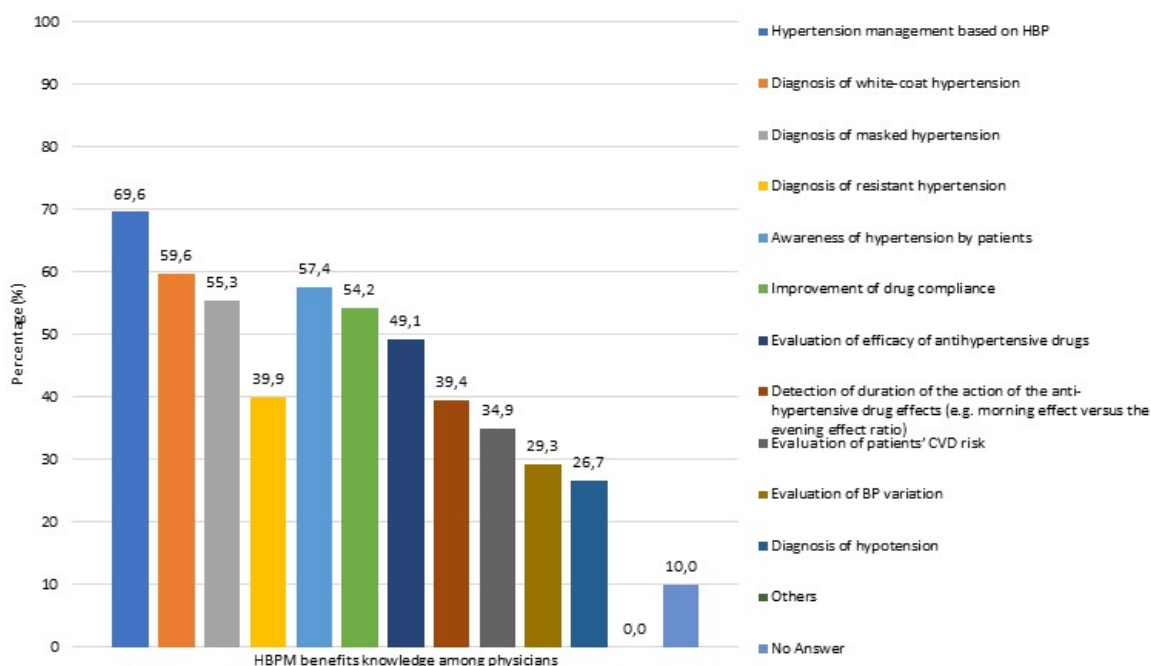


Figure 1. The physicians' knowledge of HBPM benefits (n= 611)

HBPM: home blood pressure monitoring; HBP: home blood pressure; CVD: cardiovascular disease; BP: blood pressure

country, while 41.4% thought it is moderately known, and 12.8% believe it is poorly known (Figure 3a). The barriers causing the moderate and poor knowledge of HBPM among physicians in Indonesia were lack of guidelines for HBPM (47.1%), lack of understanding of HBPM (43.5%), and low recommendation of HBPM in the guidelines (35.1%), whereas around one-third of the physicians think that concerns of reliability

and accuracy of HBPM device are a barrier to the dissemination of HBPM in the country (Figure 3b).

Apart from the physicians' point of view on HBPM, the participants were asked questions about their patients' attitude toward HBPM. The knowledge of HBPM among the patients was perceived to be high among 31.1%, moderate among 26.2%, and poor among 33.1% (Figure

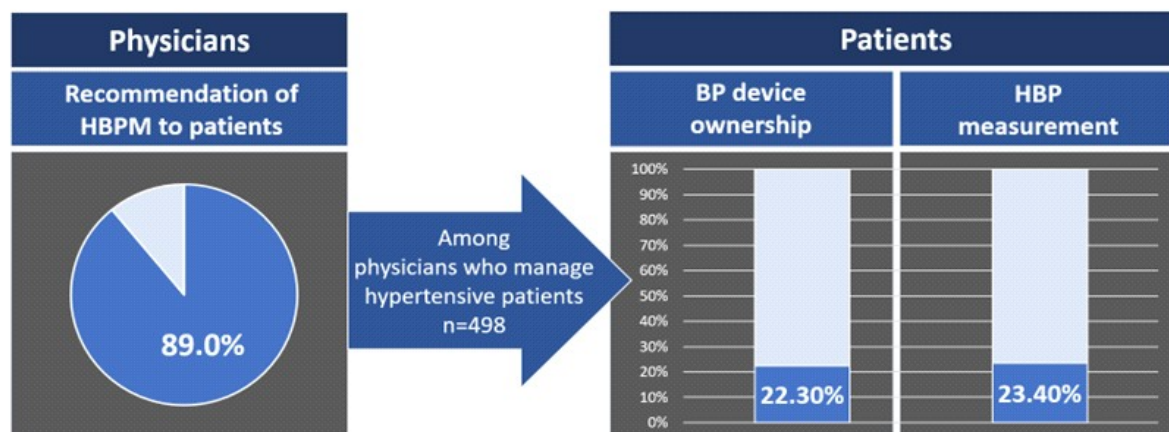
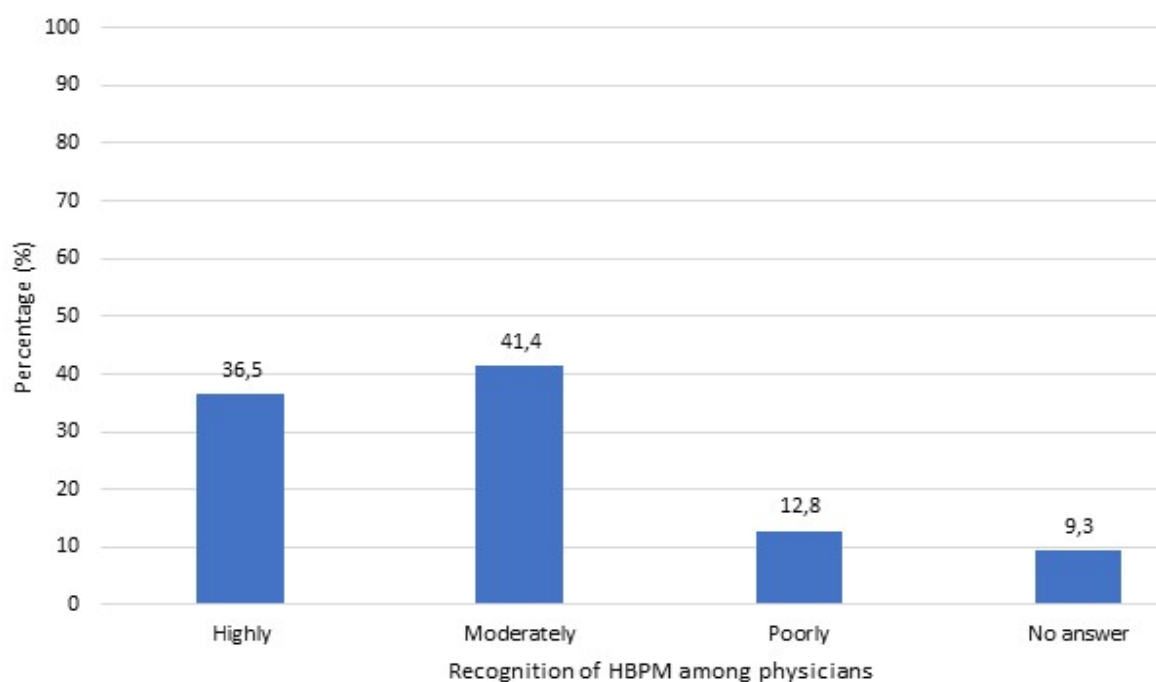


Figure 2. Physicians' recommendations of HBPM to patients and perceived percentage of patient ownership of BP device and HBP measurement in Indonesia

HBPM: home blood pressure monitoring; HBP: home blood pressure; BP: blood pressure

A



B

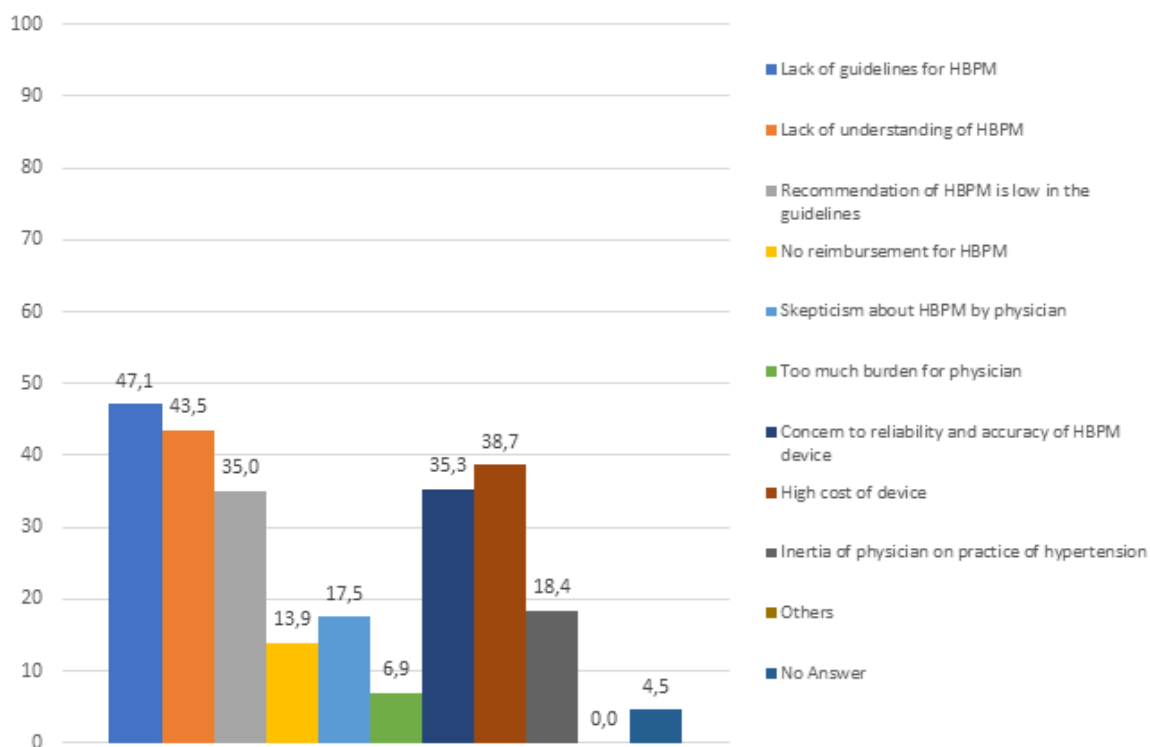


Figure 3. Physicians’ views on other physicians’ knowledge of HBPM in Indonesia. a) Answer to “Do you think that the significance of HBPM is well known by physicians in your country?”. b) The barriers of moderate or poor knowledge of HBPM by other physicians in Indonesia

HBPM: home blood pressure monitoring

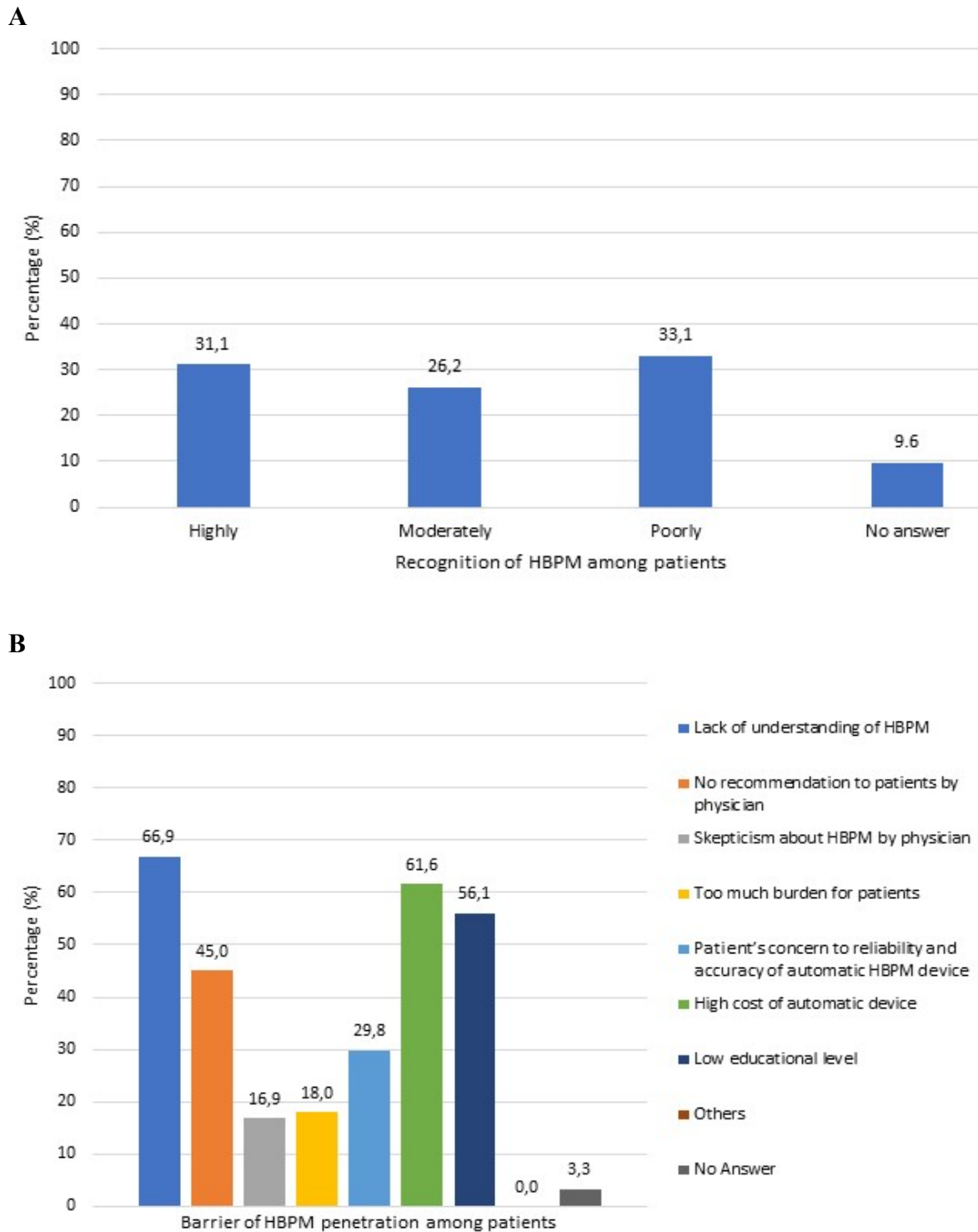


Figure 4. Physicians’ views on patients’ knowledge of HBPM in Indonesia. a) Answer to “Do you think that significance of HBPM is well known by patients with hypertension in your country?”. b) The barriers of moderately or poorly recognition of HBPM by patients in Indonesia
 HBPM: home blood pressure monitoring

4a). The main barriers to adequate knowledge of HBPM among the patients were their lack of understanding of HBPM (66.9%), high cost of the BP monitoring devices (61.6%), low educational level of the patients (56.1%), and lack of recommendation to patients by physicians (45.0%) (Figure 4b).

With respect to the practice of the physicians, a large percentage of the respondents recommends HBPM, in line with the recommendations in the local HBPM guidelines regarding the type of device being the automatic digital device (75.3%) and the upper-arm cuff device (88.2%) (Table 3).

On the instructions to measure HBP, a considerable proportion of the participants' answers were in line with the HBPM guidelines on morning HBP measurement one hour after waking up (84.1%), after micturition (48.9%), in the sitting position (62.7%), before breakfast (47.3%), and in the evening before bedtime (62.9%). A noticeable fraction of the participants, ranging between 7.5-29.5%, provided no instructions on the preceding guided steps of HBP measurement. In regard to taking anti-hypertensive medications in the morning, the local guidelines specified measuring HBP prior to taking the medications. However, only 36.5% of the respondents answered "prior to taking the medication", 35.8% answered "after taking the medication", and 18.3% gave no instruction on taking the medication.

DISCUSSION

This survey was conducted to obtain the Indonesian physicians' knowledge, attitude, and practices on HBPM after the dissemination of the local HBPM guidelines. With respect to the physicians' knowledge of the reference value of hypertension diagnosis, less than half the physicians knew the CBP reference value, whereas under 10% knew the HBP reference value. The main barriers to the physicians' awareness of HBPM in the country were anticipated to be due to the lack of HBPM

guidelines and low recommendations of HBPM in the guidelines, in addition to the physicians' lack of understanding of HBPM. On the practice of HBPM that derived from the physicians' instructions on HBPM to their patients, the majority of the physicians was in line with the recommendations. In comparison with local HBPM guidelines, however, a substantial percentage of the physicians gave no instructions on HBPM. The findings from the survey highlighted the still poor dissemination of the Indonesian HBPM guidelines among the physicians in the country and the fact that robust and effective dissemination and implementation of the local HBPM guidelines in clinical practice is still needed in Indonesia.

We found that 89.0% of the physicians recommended HBPM to their patients, which percentage was higher than in the other surveys conducted in Spain (67%), and US (32%).^(14,15) This finding in comparison to that of the other surveys shows that Indonesian physicians accept and recommend HBPM to a greater extent than do physicians in other countries. Even though the recommendation is high among the physicians, around 7.5 - 29.5% gave no instructions on measuring HBP to their patients, and 18.3% gave no instructions on the timing of taking anti-hypertensive medications, whereas an equal number of physicians instructed their patients to measure HBP before and after taking anti-hypertensive medications. Additionally, only 47.3% of the physicians instructed their patients to measure HBP before breakfast, whereas around 23% gave no instructions. A similar survey in Japan among physicians exploring the same aspects of HBPM instructions showed that a higher proportion of physicians instructed their patients to measure HBP before taking anti-hypertensive medications (74.7%) and before breakfast (79.2%).⁽¹⁶⁾ Since Japan was the first country in the world to establish guidelines on self-monitoring blood pressure at home in 2003,⁽¹⁷⁾ the results of the Japanese survey show that efficient dissemination of the HBPM guidelines in clinical practice leads to proper instructions on HBPM

Table 3. The instructions the physicians recommended to their patients on practicing HBPM (n=611)

HBPM practice	n (%)	
Type of HBPM device recommended to patients		
Automatic digital device	460	(75.3)
Aneroid device	24	(3.9)
Mercury device	70	(11.5)
No answer	57	(9.3)
Type of automatic device recommended to patients		
Upper-arm-cuff device	539	(88.2)
Wrist device	18	(3.0)
Finger device	2	(0.3)
None specified	6	(1.0)
No answer	46	(7.5)
Instructions on HBPM measurement		
Morning		
Timing of measurement after waking up		
Just after	218	(35.7)
Within 30min	218	(35.7)
Within an hour	78	(12.8)
No instruction	46	(7.5)
No answer	51	(8.3)
Micturition		
Before	77	(12.6)
After	299	(48.9)
No instruction	180	(29.5)
No answer	55	(9.0)
Body position		
Sitting position	383	(62.7)
Recumbent position	109	(17.8)
No instruction	64	(10.5)
No answer	55	(9.0)
Time of rest before measurement (min)		
None	20	(3.3)
1–2	50	(8.2)
3–4	38	(6.2)
≥ 5	390	(63.8)
No instruction	59	(9.7)
No answer	54	(8.8)
Taking antihypertensive drug		
Before	223	(36.5)
After	219	(35.9)
No instruction	112	(18.3)
No answer	57	(9.3)
Breakfast		
Before	289	(47.3)
After	125	(20.5)
No instruction	142	(23.2)
No answer	55	(9.0)
Evening		
Before dinner	58	(9.5)
After dinner	57	(9.3)
Before bedtime	384	(62.9)
Other	2	(0.3)
No instruction	48	(7.9)
No answer	62	(10.1)

Values are expressed as n (%); HBPM: home blood pressure monitoring

by physicians to their hypertensive patients. Japan could be taken as an example that can also be locally emulated, since Indonesia already has local HBPM guidelines. The inconsistent instructions on the timing of HBPM before anti-hypertensive medications to hypertensive patients in Indonesia as seen in this survey is troubling, since this point is mentioned clearly in both local and regional hypertension and HBPM guidelines.⁽¹⁷⁻²¹⁾ Proper education on the instructions to measure HBPM, especially before taking any hypertension medications, is vital to accurate measurement of HBP and efficient utilization of its value in hypertension management.

Accurate diagnosis of hypertension stands at the top of appropriate hypertension management, in which the key lies in the physicians' knowledge of the standard reference values to diagnose hypertension. A moderate proportion of physicians in this survey understands the use of HBP to diagnose white-coat (59.6%) and masked hypertension (55.3%). However, the physicians' knowledge of the reference value to diagnose hypertension by HBP is considerably low (7.9%). This low understanding of the standard reference value of HBP to accurately diagnose white-coat and masked hypertension may lead to the misdiagnosis of these phenotypes of hypertension. The local HBPM guidelines, as well as global guidelines, indicate the clear definition of correct diagnosis of hypertension by HBP to be 135/85 mmHg.^(22,23) Nevertheless, regardless of the source of information, the Indonesian physicians' utilization of the guidelines for HBP reference values still seems to fall short and attention should be focused on providing user-friendly, clear, and concise standard education to the physicians on the basic knowledge of hypertension diagnosis and management, especially using HBPM.

The benefits and applicability of HBPM in clinical practice range from the accurate diagnosis of hypertension phenotypes to decisions on therapy, titration of BP-lowering medications, and monitoring of BP control in patients.^(17,24,25) The physicians and healthcare providers are the

primary source of information for the patients in recommending HBPM and instructing the patients appropriately on the method of BP measurement at home. A study by Wake et al.⁽²⁶⁾ showed that the tendency of patients to self-monitor BP is six times greater when they receive recommendations from health professionals to self-monitoring of BP. Another study revealed that the healthcare provider's advice was the prominent contributor to HBPM device ownership and weekly practice of HBPM by the patients, with the odds ratio being at 13.50 and 8.97, respectively.⁽²⁷⁾ This available evidence further magnifies the importance of physicians' proper education and knowledge of HBPM. From our study, even though a high proportion of the physicians recommend HBPM, a substantial percentage think that the main barrier to HBPM recognition among other physicians in the country is lack of guidelines, low recommendations of HBPM in the guidelines, and lack of understanding of HBPM by the physicians. The findings from this survey reveal that thus far the available local HBPM guidelines have not yet penetrated greatly among the physicians and that their awareness of the instructions in the guidelines is still low. More robust and practical methods to disseminate the local HBPM guidelines are essential and finding alternative platforms for this dissemination may help in reaching a wider spectrum of physicians and healthcare professionals to efficiently bring about the awareness of and proper instruction on HBPM. Furthermore, developing user-friendly educational tools, such as a physicians' pocket guide for clinical practice, may play an important role as a reachable source of knowledge of HBPM instructions.

The survey also studied the knowledge of the patients on HBPM in Indonesia. Around 59% of the physicians answered that HBPM is moderately or poorly known among their patients, the main reason being a lack of understanding of HBPM among the patients. Both the ownership of the HBPM device and HBP measurement were considerably low among the

patients as perceived by the respondents (22.3% and 23.4%, respectively). A survey study in Singapore among hypertensive patients showed that even though the awareness rate of HBPM among the patients was 61.7%, only 24.0% actually used HBPM.⁽²⁸⁾ The results from our survey were comparably low as perceived by physicians in Indonesia. The measurement rate of HBPM seems still to be low in this country, and raising the awareness of HBPM among patients through education and through active recommendation of HBPM by physicians are the key factors to improving the practice of HBPM among patients in Indonesia.

The strength of this study is that it is a part of the Asia HBPM Survey 2020 that was conducted in 11 Asia Pacific countries, and was published recently by Wang et al.,⁽¹³⁾ making it possible to compare the results with neighboring countries. Additionally, the study was conducted using both online and offline platforms which increased the participation rate, hence the high number of respondents. Nevertheless, the study has the limitation of being susceptible to selection bias, as a larger proportion of the respondents was recruited during a local annual scientific meeting and almost a quarter of the specialists who responded were neurologists, a specialty that does not primarily manage hypertensive patients. Additionally, the study results of the patients are perceived from the physicians' responses, therefore a comparative survey from the patient's point of view is needed. Lastly, although the sample size is moderately sufficient, the survey needs to be conducted on a larger sample size to be representative of the Indonesian physicians' population and at a nationwide level, as the current survey was conducted mainly in Jakarta. The survey results revealed that even though the majority of physicians recommend HBPM to their patients, the knowledge, attitude, and practice of HBPM among the physicians were suboptimal. These findings after the establishment of the local HBPM guidelines show that much work is needed to disseminate the guidelines properly and effectively among physicians and to provide the

educational tools to implement HBPM in clinical practice. Moreover, another survey a couple of years after the initiative of educational tools and guidance of HBPM is needed to evaluate the effectiveness of the activities and to assess the knowledge and application of HBPM in practice and understanding of the importance of HBPM in hypertension management.

CONCLUSION

In conclusion, the majority of the physicians in Indonesia recommends HBPM to their patients; however, the knowledge, attitude, and practice of the physicians were suboptimal. The awareness and dissemination of the local HBPM guideline published in 2019 in Indonesia are still low and robust efforts should be dedicated to disseminating the local guidelines among the physicians and healthcare providers in the country, in addition to developing more user-friendly educational tools such as a physicians' pocket guide of HBPM instructions to be utilized in clinical practice.

CONFLICT OF INTEREST

ES is an employee of Omron Healthcare Co. Ltd. NM is an employee of Omron Healthcare Singapore Pte. Ltd. The other authors declare that there is no conflict of interest regarding the publication of this paper.

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CONTRIBUTORS

YT, ES, and NM contributed to the conception, study design, interpretation, and write-up; YT, ES, NM, VGW, AAS, BW, EH, RS, and

TDS contributed to data collection for analysis and write-up of the draft and final manuscript. YT and VGW oversaw the data collection process and overall research work including interpretation of results, and critically reviewing and revising the manuscript. All authors read and approved the final version to be submitted for publication.

DATA AVAILABILITY STATEMENT

The data used to support the findings of this study is available from the corresponding author upon request.

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PATIENT AND PUBLIC INVOLVEMENT

No patients were involved in the study. The participants were physicians and they were not involved in the design, or conduct, or reporting, or dissemination of the plans of this research.

PROVENANCE AND PEER REVIEW

Not commissioned; internally peer-reviewed.



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