ORIGINAL RESEARCH

Number of Measurements Needed to Obtain a Reliable Estimate of Home Blood Pressure: Results From the Improving the Detection of Hypertension Study

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***Background*—**Obtaining out-of-clinic blood pressure (BP) measurements to confirm a diagnosis of hypertension is recommended before initiating treatment. There are few empiric data available on the number of measurements required to reliably estimate BP on home BP monitoring (HBPM).

***Methods and Results*—**We analyzed data from 316 community-dwelling adults not taking antihypertensive medication from the IDH (Improving the Detection of Hypertension) study who performed HBPM for 14 days. The reliability of home BP measurements was assessed using the intraclass correlation coefficient and as the percentage of participants with an absolute difference in home BP <10 mm Hg between weeks. The reliability of home hypertension status was assessed by the κ statistic. In the IDH study, 13.6% of participants had clinic hypertension and 18.0% had home hypertension. Mean home systolic and diastolic BP exhibited excellent reliability and sufficient agreement using the average of 2 morning and 2 evening BP readings for a minimum of 2 days of HBPM and a single morning and single evening or 2 morning BP readings for a minimum of 3 days. For diagnosing home hypertension, there was good agreement with a minimum of 3 days of HBPM using the average of 2 morning and 2 evening measurements or a single morning and single evening BP reading. A greater number of days was required for the other HBPM strategies.

***Conclusions*—**Using the average of morning and evening readings, 3 days of HBPM are needed to reliably estimate mean home BP and diagnose out-of-clinic hypertension. **(*J Am Heart Assoc*. 2018;7:e008658. DOI: 10.1161/JAHA.118.008658.)**

Key Words: diagnosis • high blood pressure • hypertension • reproducibility

In 2015, the US Preventive Services Task Force (USPSTF) reaffirmed its recommendation to screen all adults 18 years and older for high blood pressure (BP).[1] The USPSTF and, more recently, the 2017 American College of Cardiology (ACC)/American Heart Association (AHA) Guideline for the Prevention, Detection, Evaluation, and Management of High Blood Pressure in Adults further recommend obtaining BP measurements outside of the clinic setting to confirm the diagnosis of hypertension before initiating treatment.[1,2]

Home BP monitoring (HBPM) is an approach for measuring out-of-clinic BP to confirm a diagnosis of hypertension after initial BP screening in the clinic.[3] There are few studies that have compared the reliability of different HBPM strategies that vary in the number of days HBPM is performed, the time(s) of day BP is assessed, and the number of measurements that are taken at each assessment.[4–7] Based on expert opinion, several guidelines[3,8–11] have recommended that 2 home BP readings be obtained by the patient in the morning and in the evening for a preferred period of 7 days, with a minimum of 3 days of HBPM. The 2017 ACC/AHA guidelines on high BP recommend that multiple home BP readings (at least 2 readings 1 minute apart in the morning and in the evening) should be taken, and home BP should be based on an average of readings on ≥2 occasions for clinical decision-making.[2]

In the current study of a community-based sample of adults not taking antihypertensive medication, we examined

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Accompanying Tables S1 through S7 and Figures S1 through S4 are available at https://www.ahajournals.org/doi/suppl/10.1161/JAHA.118.008658

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Clinical Perspective

What Is New?

- This community-based study of adults who were not taking any antihypertensive treatment showed that using the average of morning and evening readings a minimum of 3 days are needed to reliably estimate out-of-office blood pressure and confirm a diagnosis of hypertension.
- A longer period of monitoring using other home blood pressure monitoring strategies is needed to achieve similar reliability.

What Are the Clinical Implications?

- Healthcare providers can use these findings to interpret patient-provided home blood pressure monitoring data and determine whether an adequate number of out-of-office readings have been obtained or whether further monitoring is needed.

the reliability of mean home BP and, secondarily, hypertension status when based on 1 to 7 days of measurements, 1 to 4 readings per day, and morning or evening readings. These data can inform clinicians and patients on how HBPM should be conducted to obtain a reliable estimate of mean home BP.

Methods

Study Population

The IDH (Improving the Detection of Hypertension) study was designed to compare different strategies for the diagnosis of hypertension. The IDH study enrolled a community-based sample of 408 adults older than 18 years primarily from upper Manhattan between March 2011 and October 2013.[12,13] Participants were ineligible for the study if they had any of the following: a clinic systolic/diastolic BP ≥160/105 mm Hg; evidence of secondary hypertension; antihypertensive medication use or were taking any other medications known to affect BP; a history of overt cardiovascular disease (CVD), chronic kidney disease, liver disease, adrenal disease, thyroid disease, rheumatologic disease, hematologic disease, cancer, or dementia; history of organ transplantation; or current pregnancy. All participants provided informed consent, and the study protocol was approved by Columbia University's institutional review board. The data, analytic methods, and study materials may be made available to other researchers for purposes of reproducing the results upon reasonable request.

Study Procedures

Demographics were ascertained at a baseline visit using a self-administered questionnaire and information about CVD risk factors was ascertained by a structured interview during a subsequent study visit. Participants underwent HBPM for up to 21 days, with readings obtained twice in the morning and twice in the evening. Data from the first 2 weeks were used for the current analyses.

Clinic BP Measurement

Following a 5-minute rest, clinic BP was measured in each participant's nondominant arm, 3 times with at least 1 minute between readings.[14] All readings were performed by a research nurse/technician using a mercury sphygmomanometer (Baum), an appropriate-sized arm cuff, and a high-quality stethoscope. Clinic BP was defined as the mean of the 3 readings.

Home BP Measurement

Participants attended a second visit 1 day after the baseline visit during which they were given an Omron HEM-790IT (HEM-7080-ITZ2) or HEM-791IT (HEM-7222-ITZ)[8,15] with an appropriate-sized cuff and educated on its use. These devices store all BP measurements electronically. Participants were asked to obtain home BP measurements in the seated position after 5 minutes of rest with 1 minute between readings and were instructed to measure their BP 2 times in the morning immediately after awakening and 2 times in the evening for up to 3 consecutive weeks. Data from the first 2 weeks (days 1–7 and days 8–14) were used for the current analysis. Participants who withdrew from the study (n=8) or who did not have at least 3 complete days of home BP data with 2 morning and 2 evening readings during both weeks 1 and 2 (n=84) were excluded from the present analyses, leaving a final sample size of 316 participants.

Definition of Hypertension Categories

Clinic hypertension was defined as mean clinic systolic BP ≥140 mm Hg and/or clinic diastolic BP ≥90 mm Hg. Home hypertension was defined as mean home systolic BP ≥135 mm Hg and/or mean home diastolic BP ≥85 mm Hg.[9,11,16,17] In sensitivity analyses, clinic and home hypertension were defined using the BP thresholds recommended in the 2017 ACC/AHA high BP guideline (mean clinic systolic BP ≥130 mm Hg and/or mean clinic diastolic BP ≥80 mm Hg and mean home systolic BP ≥130 mm Hg and/or mean home diastolic BP ≥80 mm Hg).[2]

Statistical Analysis

Characteristics of IDH study participants included in the current analysis were summarized as mean and SD for

continuous variables or percentage of participants for categorical variables.

Mean daily home systolic and diastolic BPs were calculated as the average of 2 morning and 2 evening readings for all 7 days in week 1. Further, mean home systolic and diastolic BP were calculated for each participant as the average of 2 morning and 2 evening readings for 6 days (days 1–6), 5 days (days 1–5), 4 days (days 1–4), 3 days (days 1–3), 2 days (days 1–2), and 1 day (day 1). The same approach was used to calculate mean daily home systolic and diastolic BP in week 2. For each week, analyses were repeated using (1) the first morning and first evening reading, (2) the 2 morning readings, (3) the first morning reading, (4) the 2 evening readings, and (5) the first evening reading.

Mean daily home systolic and diastolic BP were compared among days during week 1 and separately week 2 for each of the 6 HBPM strategies defined above (2 morning and 2 evening, 1 morning and 1 evening, 2 morning, 1 morning, 2 evening, 1 evening). Using the data for all 14 days, we estimated a multilevel nested repeated measures ANOVA model (day, nested within week) in order to test for differences in mean systolic and diastolic BP by day (day 1 versus day 2 versus . . . day 7). Next, for each HBPM strategy, the within-participant difference in mean home systolic and diastolic BP between week 1 and week 2 was calculated. Overall mean home systolic and diastolic BPs during week 1 and week 2 were compared for each HBPM strategy using paired *t* tests.

The reliability of home systolic BP and home diastolic BP was assessed using the intraclass correlation for agreement coefficient for weeks 1 and 2. The 95% lower 1-sided confidence limit (LCL) of the intraclass correlation coefficient (ICC) was calculated using the β-distribution approach described by Demetrashvili et al.[18] An ICC (95% LCL) ≥0.80 was a priori considered to indicate the presence of excellent reliability.[19–21] A 1-sided confidence interval was used as we were interested in identifying the minimum number of days of measurement required to provide a sufficiently reliable estimate of mean home BP. Additionally, the percentage of participants for whom the absolute difference in home systolic and diastolic BP between weeks 1 and 2 was <10 mm Hg was calculated.[22] We a priori defined sufficient agreement to be present if ≥85% of participants had a difference <10 mm Hg. An intraindividual systolic and diastolic BP difference of <10 mm Hg has been considered to be a tolerable error for BP measurement in clinical practice.[23,24] The reliability of home hypertension status between weeks 1 and 2 was assessed using the κ statistic.[25] As previously proposed, a κ statistic ≥0.60 was considered to represent good agreement.[25–27] We considered requiring the 95% LCL of the κ statistic to be ≥0.60 as the criterion for good agreement. However, the confidence intervals were wide and the study was underpowered to detect a 95% LCL of the κ statistic ≥0.60. Therefore, we used the point estimate of the κ statistic ≥0.60 as the criterion for good agreement. SAS version 9.4 (SAS Institute) was used for all analyses. The analyses for the reliability of home hypertension were repeated using the BP thresholds recommended in the 2017 ACC/AHA high BP guideline.[2] A $P<0.05$ was used as the threshold for statistical significance.

Results

Participant Characteristics

The mean (SD) age of participants was 42.3 (13.3) years, 60.8% were women, 62.0% were Hispanic, 26.3% were black, 13.6% had clinic hypertension, and 18.0% had home hypertension (Table 1). Table 2 shows the mean number of readings obtained per participant for each HBPM strategy. During week 1, there were no statistically significant differences in mean home systolic and diastolic BP across days (day 1 versus day 2 versus . . . day 7) when calculated using 2 morning and 2 evening readings, single morning and single evening readings, 2 morning readings, a single morning reading, 2 evening readings, or a single evening reading (data not shown). Results were similar for week 2.

Reliability of Each Measurement Strategy to Estimate Mean Home BP

Strategies using both morning and evening readings

When using 2 morning and 2 evening readings per day to define daily BP, there were no statistically significant differences in mean home systolic and diastolic BP between weeks 1 and 2, regardless of the numbers of days for which HBPM was performed (Table 3). For the strategy of using 2 morning and 2 evening readings per day, the ICCs for the 7-day mean home systolic and diastolic BP were excellent with the 95% LCL of the ICCs being above 0.80 (0.95 [1-sided 95% LCL 0.94] and 0.94 [1-sided 95% LCL 0.93], respectively) (Figure 1). The ICCs for mean home systolic and diastolic BP were excellent using the mean of at least 2 days with 2 morning and 2 evening readings, and for at least 3 days when using the mean of a single morning and single evening reading.

When defining mean home BP as the mean of 7 days of 2 morning and 2 evening readings of HBPM, 100% of the participants had <10 mm Hg absolute difference between weeks 1 and 2 for both home systolic and diastolic BP (Figure 2). The percentage of participants with an absolute difference in home BP <10 mm Hg declined as the number of days of HBPM decreased from 7 to 1 days. There was

Table 1. Characteristics of the Improving the Detection of Hypertension Study Participants

Characteristics	Analysis Sample (N=316)
Age, y	42.3 (13.3)
Women, %	60.8
Race/ethnicity	
Non-Hispanic black, %	15.5
Hispanic, %	62.0
Non-Hispanic white, %	15.2
Other, %	7.3
BMI, kg/m^2	27.6 (5.1)
Self-reported diabetes mellitus, %	2.5
Fasting glucose, mg/dL	86.2 (27.8)
Glycated hemoglobin, %	5.4 (0.9)
Cholesterol	
Total, mg/dL	185.1 (41.4)
Triglycerides, mg/dL	102.0 (55.7)
HDL, mg/dL	52.3 (13.5)
LDL, mg/dL	112.4 (36.9)
Smoking status	
Never, %	83.2
Past, %	9.8
Current, %	7.0
Alcohol use*	
Nondrinker, %	45.3
Moderate drinker, %	50.6
Heavy drinker, %	4.1
Mean clinic BP†	
Systolic, mm Hg	117.1 (16.0)
Diastolic, mm Hg	76.3 (10.1)
Clinic hypertension, %	13.6
Mean home BP‡	
Systolic, mm Hg	115.4 (13.3)
Diastolic, mm Hg	76.6 (9.1)
Home hypertension, %§	18.0

Data are presented as mean (SD) or percentage. BMI indicates body mass index; HDL, high-density lipoprotein; LDL, low-density lipoprotein.
*Alcohol use defined as: nondrinker (no weekly alcohol consumption), moderate drinker (1–14 and 1–7 alcoholic beverages per week for men and women, respectively), or heavy drinker (>14 and >7 alcoholic beverages per week for men and women, respectively).
†Calculated as the mean of 3 readings.
‡Calculated as the mean of 2 morning and 2 evening readings across days 1 to 14.
§Defined as having a mean home systolic blood pressure (BP) ≥135 mm Hg or mean home diastolic BP ≥85 mm Hg.

sufficient agreement (≥85% of participants had a difference <10 mm Hg) with ≥2 days of HBPM for home systolic BP, and ≥1 days of HBPM for diastolic BP when using 2 morning and 2 evening readings or a single morning and single evening reading.

Strategies using morning readings only

When using 2 or 1 morning readings per day, there were no statistically significant differences in mean home systolic and diastolic BP between weeks 1 and 2, regardless of the number of days HBPM was performed (Table S1). Using 2 morning readings per day, the ICCs were excellent (ie, 95% LCL of the ICCs ≥0.80) with ≥3 days of HBPM for home systolic and diastolic BP (Figure S1). Using a single morning reading per day, the ICCs were excellent with ≥3 days of HBPM for home systolic BP and with ≥4 days of HBPM for home diastolic BP.

Defining mean home BP using 2 morning readings per day for 7 days of HBPM had sufficient agreement; 99% and 100% of participants had a difference <10 mm Hg for home systolic and diastolic BP, respectively (Figure S2). There was sufficient agreement between weeks with ≥2 days of HBPM for home systolic BP and ≥1 days of HBPM for diastolic BP. Using a single morning reading per day, there was sufficient agreement with ≥3 days of HBPM for home systolic BP and ≥1 days of HBPM for diastolic BP.

Strategies using evening readings only

When using 2 or 1 evening readings per day, there were no statistically significant differences in mean home systolic and diastolic BP between weeks 1 and 2, regardless of the number of days HBPM was performed (Table S2). Using 2 or 1 evening readings per day, the ICCs were excellent (95% LCL of the ICCs ≥0.80) with ≥4 days of HBPM for home systolic BP and diastolic BP (Figure S3).

Defining mean home BP using 2 evening readings per day across 7 days of HBPM had sufficient agreement; 99% and 100% of participants had an absolute difference <10 mm Hg for home systolic and diastolic BP, respectively, between weeks 1 and 2 (Figure S4). There was sufficient agreement with ≥2 days of HBPM for home systolic BP and ≥1 days of HBPM for diastolic BP. When using a single evening reading per day, there was sufficient agreement with ≥3 days of HBPM for home systolic BP and ≥1 days of HBPM for diastolic BP.

Reliability of Home Hypertension Status

Using 2 morning and 2 evening readings or a single morning and single evening reading, the κ statistic for home hypertension between week 1 and week 2 indicated good agreement (≥0.60) with ≥3 days of HBPM (Table 4). When using 2 morning readings or a single morning reading, the κ statistic indicated good agreement with ≥4 days of HBPM (Table S3). To obtain good agreement, ≥5 days of HBPM were needed when using 2 evening readings, and ≥6 days of HBPM were needed when using a single evening reading (Table S4).

Table 2. Mean (SD) Number of Readings Per Participant by Number of Days of HBPM Compared With the Expected Number of Readings Obtained With Perfect Adherence to HBPM Strategy Tested

	Morning and Evening Readings			Morning Readings Only			Evening Readings Only		
		Mean (SD) Obtained			Mean (SD) Obtained			Mean (SD) Obtained	
No. of Days	Expected	Week 1	Week 2	Expected	Week 1	Week 2	Expected	Week 1	Week 2
Two readings per occasion									
7	28	25.4 (2.6)	24.6 (3.1)	14	13.0 (1.6)	12.6 (1.8)	14	12.4 (1.8)	12.0 (2.1)
6	24	21.8 (2.4)	21.1 (2.7)	12	11.1 (1.5)	10.8 (1.6)	12	10.7 (1.6)	10.3 (1.9)
5	20	18.2 (2.1)	17.7 (2.4)	10	9.3 (1.4)	9.0 (1.4)	10	8.9 (1.4)	8.7 (1.7)
4	16	14.5 (1.8)	14.1 (2.2)	8	7.4 (1.1)	7.2 (1.3)	8	7.1 (1.3)	6.9 (1.5)
3	12	10.9 (1.5)	10.7 (1.8)	6	5.5 (0.9)	5.5 (1.0)	6	5.4 (1.0)	5.2 (1.2)
2	8	7.2 (1.3)	7.1 (1.4)	4	3.7 (0.7)	3.7 (0.7)	4	3.6 (0.8)	3.5 (0.9)
1	4	3.6 (0.8)	3.7 (0.7)	2	2.0 (0.1)	2.0 (0.1)	2	2.0 (0.2)	2.0 (0.1)
One reading per occasion									
7	14	12.8 (1.3)	12.4 (1.5)	7	6.5 (0.8)	6.3 (0.9)	7	6.3 (0.9)	6.0 (1.0)
6	12	11.0 (1.2)	10.6 (1.4)	6	5.6 (0.7)	5.5 (0.8)	6	5.4 (0.8)	5.2 (0.9)
5	10	9.2 (1.0)	8.9 (1.2)	5	4.7 (0.7)	4.5 (0.7)	5	4.5 (0.7)	4.4 (0.8)
4	8	7.3 (0.9)	7.1 (1.1)	4	3.7 (0.5)	3.6 (0.7)	4	3.6 (0.6)	3.5 (0.7)
3	6	5.5 (0.7)	5.4 (0.9)	3	2.8 (0.5)	2.8 (0.5)	3	2.7 (0.5)	2.6 (0.6)
2	4	3.7 (0.6)	3.6 (0.7)	2	1.9 (0.3)	1.9 (0.4)	2	1.8 (0.4)	1.8 (0.4)
1	2	1.8 (0.4)	1.8 (0.4)	1	1.0*	1.0*	1	1.0*	1.0*

HBPM indicates home blood pressure monitoring.
*With 1 reading per day there is no variability of readings by definition.

Using the BP thresholds recommended in the 2017 ACC/AHA high BP guideline, 39.9% of participants had clinic hypertension and 37.0% had home hypertension. The κ statistic indicated good agreement with ≥2 days of HBPM using 2 morning and 2 evening readings and ≥3 days of HBPM using a single morning and single evening reading (Table S5), ≥2 days of HBPM using 2 morning readings and ≥3 days of HBPM using a single morning reading (Table S6), and ≥3 days of HBPM using 2 evening readings and ≥5 days of HBPM using a single evening reading (Table S7).

Table 5 summarizes the minimum number of days of HBPM required to reliably estimate mean home BP and diagnose home hypertension using the different strategies.

Discussion

In the current study, we examined whether less burdensome strategies of HBPM provide reliable estimates of home BP among individuals not taking antihypertensive medication. Mean home BP was reliable using the average of 2 morning and 2 evening BP readings for a minimum of 2 days and a single morning and single evening reading for a minimum of 3 days. For diagnosing home hypertension, there was good agreement using a minimum of 3 days of either 2 morning and 2 evening readings or a single morning and single evening BP reading. A greater number of days of HBPM was required to reliably estimate home BP and diagnose home hypertension when using the other strategies.

Guidelines and scientific statements have recommended that out-of-clinic BP monitoring with either ambulatory BP monitoring (ABPM) or HBPM be used to identify white-coat hypertension, defined as having clinic hypertension without out-of-clinic hypertension, and masked hypertension, defined as having out-of-clinic hypertension without clinic hypertension.[2,3,8] ABPM is more commonly recommended than HBPM for measuring out-of-clinic BP[1] as there are more outcome studies demonstrating that higher BP on ABPM is associated with an increased risk of CVD.[28–30] In the United States, several barriers prevent the widespread adoption of ABPM in clinical practice. These include a lack of availability in many areas, excessive patient burden due to poor tolerability and discomfort, and unreimbursed costs.[3,31,32] The 2017 ACC/AHA high BP guideline[2] considered HBPM to be a more practical approach than ABPM for the measurement of out-of-clinic BP.

Table 3. Difference in Mean Home Systolic and Diastolic BP Between Weeks 1 and 2 of Measurement Calculated Using 2 Morning and 2 Evening Readings or a Single Morning and Single Evening Reading

No. of Days	Week 1	Week 2	Difference*	*P* Value†
Mean (SD) systolic BP, mm Hg				
Two morning and 2 evening readings				
7	115.4 (13.3)	115.5 (13.7)	−0.11 (4.36)	0.67
6	115.4 (13.4)	115.5 (13.8)	−0.12 (4.75)	0.65
5	115.4 (13.5)	115.5 (13.9)	−0.03 (5.15)	0.92
4	115.4 (13.6)	115.4 (14.2)	0.05 (5.63)	0.86
3	115.5 (13.7)	115.2 (14.2)	0.28 (6.37)	0.44
2	115.3 (13.7)	114.9 (14.3)	0.37 (7.48)	0.38
1	115.2 (14.3)	114.7 (14.9)	0.49 (10.11)	0.40
Single morning and single evening reading				
7	116.4 (13.6)	116.6 (14.0)	−0.17 (4.67)	0.51
6	116.5 (13.7)	116.6 (14.1)	−0.17 (5.12)	0.55
5	116.6 (13.9)	116.6 (14.2)	−0.01 (5.55)	0.98
4	116.5 (14.0)	116.4 (14.5)	0.09 (6.19)	0.80
3	116.6 (14.1)	116.4 (14.6)	0.20 (7.12)	0.61
2	116.3 (14.2)	116.1 (14.9)	0.21 (8.63)	0.67
1	116.1 (15.1)	115.9 (15.5)	0.18 (11.59)	0.78
Mean (SD) diastolic BP, mm Hg				
Two morning and 2 evening readings				
7	76.6 (9.1)	76.7 (9.2)	−0.09 (3.15)	0.62
6	76.6 (9.2)	76.7 (9.3)	−0.07 (3.41)	0.72
5	76.6 (9.3)	76.6 (9.3)	−0.02 (3.63)	0.94
4	76.6 (9.4)	76.5 (9.4)	0.05 (3.89)	0.82
3	76.6 (9.3)	76.4 (9.4)	0.20 (4.60)	0.44
2	76.7 (9.4)	76.4 (9.6)	0.31 (5.48)	0.31
1	76.7 (9.8)	76.1 (10.2)	0.46 (7.20)	0.26
Single morning and single evening reading				
7	76.5 (9.3)	76.5 (9.3)	−0.02 (3.35)	0.92
6	76.6 (9.4)	76.6 (9.4)	0.02 (3.68)	0.94
5	76.6 (9.5)	76.5 (9.4)	0.09 (3.91)	0.69
4	76.5 (9.6)	76.4 (9.5)	0.12 (4.23)	0.61
3	76.6 (9.6)	76.3 (9.6)	0.30 (5.01)	0.28
2	76.7 (9.7)	76.3 (9.9)	0.49 (6.14)	0.16
1	76.8 (10.2)	75.9 (10.7)	0.77 (8.25)	0.10

*Mean week 1 minus mean week 2.
†*P* value reflects whether the difference in mean blood pressure (BP) values between weeks 1 and 2 are different from zero.

A systematic review of HBPM conducted by Verberk et al[5] identified 4 studies examining the accuracy and reproducibility of HBPM.[4,33–35] These studies differed greatly from one another in the HBPM strategies they employed as well as the populations examined (ie, clinic patients versus community participants, and inclusion of individuals with both untreated and treated hypertension versus those without treated hypertension). Despite the wide variability across the 4 studies, the systematic review concluded that a minimum of 3 days of 4 daily readings (2 morning and 2 evening readings) should be obtained to estimate out-of-clinic BP. A more recent systematic review conducted for the USPSTF[29] to determine

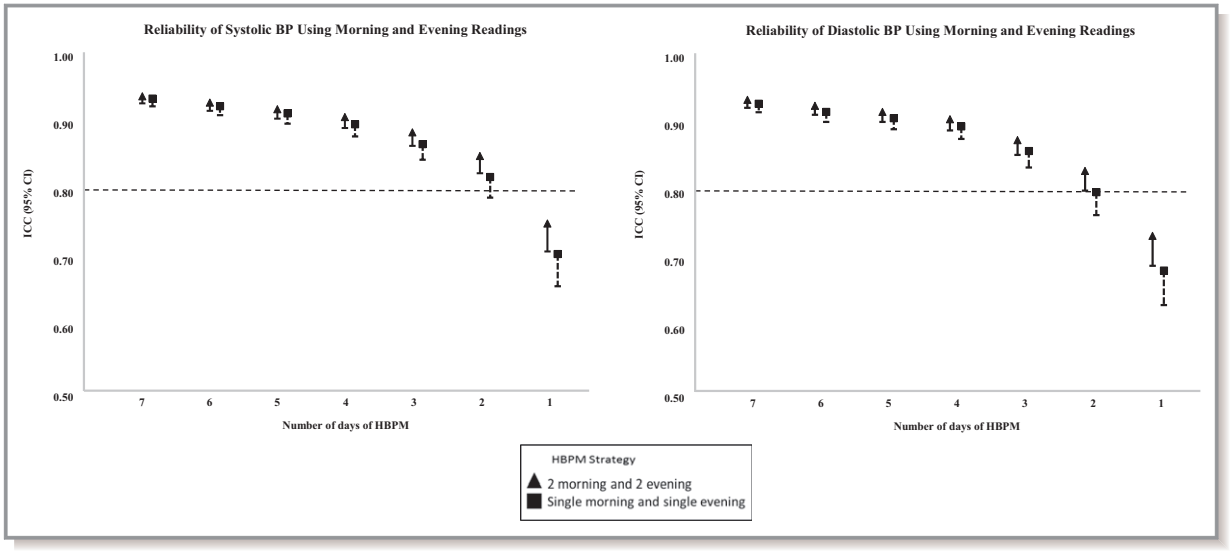

Figure 1. Reliability of mean home blood pressure (BP) between weeks 1 and 2 by number of days of home blood pressure monitoring (HBPM) using 2 morning and 2 evening readings or a single morning and single evening reading. Left panel, Reliability of HBPM for the estimation of systolic BP (intraclass correlation coefficient [ICC] and 95% lower confidence limit [LCL]). Right panel, Reliability of HBPM for the estimation of diastolic BP (ICC and 95% LCLs). Dashed line indicates 80% threshold for excellent agreement.

the diagnostic and predictive accuracy of different BP methods for CVD events identified 11 studies of HBPM.[30,36–45] There was wide variation in the conduct of HBPM across these studies, with differences in the number of days of measurement, the number of readings per days, and the timing of the readings. In contrast to Verberk and others,[3,8–11] the USPSTF did not specify how HBPM should be performed.

Data from the current study demonstrated that a greater number of days of HBPM produced more reliable estimates of home BP. Prior studies have also suggested that obtaining a greater number of home BP readings was associated with lower BP variability and improved CVD risk prediction.[6,46] Therefore, in clinical practice, it may be reasonable to encourage patients to obtain 2 morning and 2 evening readings for 7 days of HBPM, recognizing that patients may

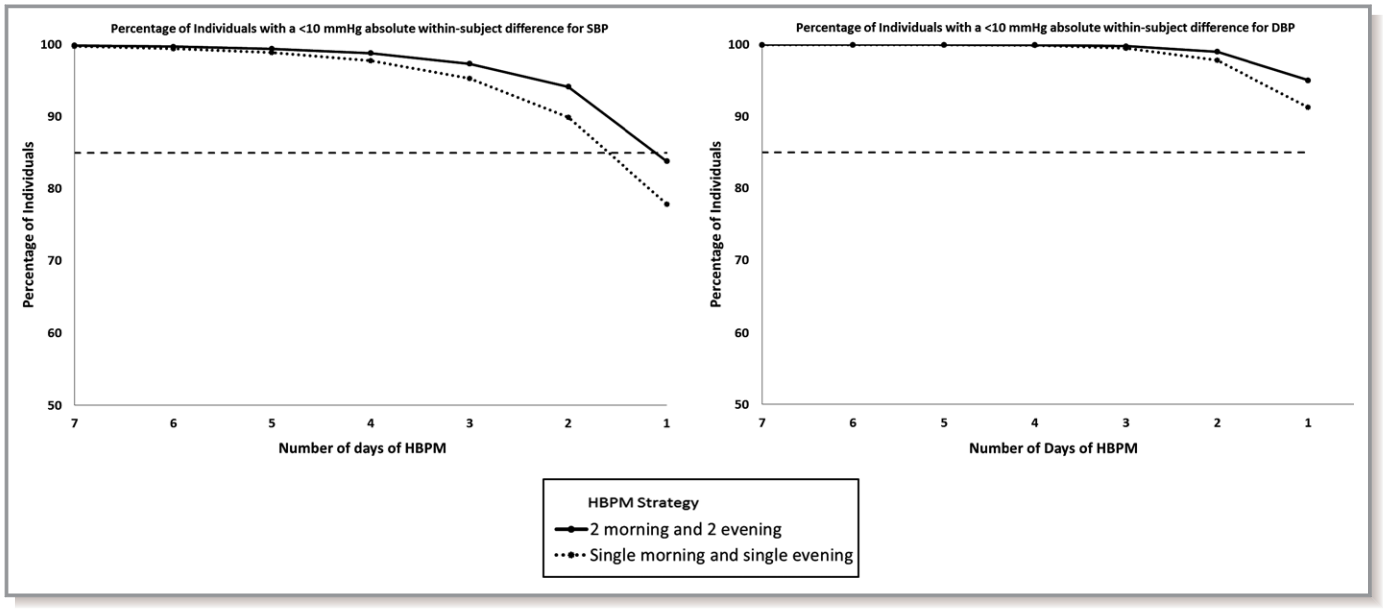

Figure 2. Percentage of participants with <10 mm Hg absolute difference between week 1 and week 2 mean home blood pressure when defining daily blood pressure using 2 morning and 2 evening readings or a single morning and single evening reading. Dashed line indicates 85% threshold for agreement. DBP indicates diastolic blood pressure; HBPM, home blood pressure measurement; SBP, systolic blood pressure.

Table 4. Prevalence and Agreement of Home Hypertension Determined Using Morning and Evening Readings

No. of Days	Week 1 or 2	Home Hypertension, %*					κ Statistic (95% LCL)	Overall Percentage Agreement (95% LCL)
		Overall No. (%)	Week 1: No Week 2: No	Week 1: No Week 2: Yes	Week 1: Yes Week 2: No	Week 1: Yes Week 2: Yes		
Two morning and 2 evening readings								
7	Week 1 Week 2	59 (18.7) 59 (18.7)	77.5	3.8	3.8	14.9	0.75 (0.67)	92.4 (89.5)
6	Week 1 Week 2	59 (18.7) 63 (19.9)	75.3	6.0	4.7	13.9	0.65 (0.57)	89.2 (85.8)
5	Week 1 Week 2	58 (18.4) 60 (19.0)	76.6	5.1	4.4	13.9	0.69 (0.60)	90.5 (87.3)
4	Week 1 Week 2	59 (18.7) 59 (18.7)	76.3	5.1	5.1	13.6	0.67 (0.58)	89.9 (86.5)
3	Week 1 Week 2	58 (18.4) 56 (17.7)	76.3	5.4	6.0	12.3	0.61 (0.52)	88.6 (85.1)
2	Week 1 Week 2	60 (19.0) 55 (17.4)	75.6	5.4	7.0	12.0	0.59 (0.49)	87.7 (84.0)
1	Week 1 Week 2	59 (19.3) 53 (17.3)	72.2	6.0	7.9	10.8	0.52 (0.42)	85.6 (81.7)
Single morning and single evening reading								
7	Week 1 Week 2	63 (19.9) 64 (20.3)	76.6	3.5	3.2	16.8	0.79 (0.72)	93.4 (90.6)
6	Week 1 Week 2	64 (20.3) 63 (19.9)	75.6	4.1	4.4	15.8	0.73 (0.65)	91.5 (88.4)
5	Week 1 Week 2	62 (19.6) 60 (19.0)	76.3	4.1	4.7	14.9	0.72 (0.63)	91.1 (88.0)
4	Week 1 Week 2	63 (19.9) 60 (19.0)	75.6	4.4	5.4	14.6	0.69 (0.60)	90.2 (86.9)
3	Week 1 Week 2	61 (19.3) 61 (19.3)	75.6	5.1	5.1	14.2	0.67 (0.59)	89.9 (86.5)
2	Week 1 Week 2	62 (19.6) 60 (19.0)	74.4	6.0	6.6	13.0	0.59 (0.50)	87.3 (83.7)
1	Week 1 Week 2	64 (20.9) 55 (18.0)	70.6	6.0	8.9	11.4	0.51 (0.41)	84.6 (80.6)

LCL indicates 95% lower confidence limit.
*Mean home systolic blood pressure (BP) ≥135 mm Hg or home diastolic BP ≥85 mm Hg.

obtain incomplete data or prefer a shorter monitoring period.[47] In the current study, 84 (21%) of the participants were excluded because they did not have at least 3 complete days of home BP data with 2 morning and 2 evening readings during both weeks 1 and 2. This is consistent with prior studies in which 24% to 34% of participants were unable to obtain the minimum number of HBPM recordings for analysis.[33,35] Given that nonadherence may be an issue for some patients, this study provides important practical data on the minimum number of days that are required to reliably estimate home BP.[48] If a patient does not complete the minimum number of days of any of the HBPM strategies, then clinicians should recommend that their patient undergo additional HBPM to obtain more readings until these minimum criteria are achieved or alternatively consider the use of ABPM.

In the current study, the prevalence of clinic hypertension and home hypertension was 13.6% and 18.0% using a clinic BP threshold of ≥140/90 mm Hg and home BP threshold of ≥135/85 mm Hg, respectively. When applying the lower BP thresholds recommended in the 2017 ACC/AHA high BP guideline,[2] the prevalence of clinic hypertension (≥130/80 mm Hg) and home hypertension (≥130/80 mm Hg) increased to 39.9% and 37.0%, respectively. Good agreement for home hypertension was present after fewer days of HBPM using the BP thresholds recommended in the 2017 ACC/AHA

Table 5. Summary of the Minimum Number of Days of HBPM Required to Reliably Estimate Mean BP and Diagnose Home Hypertension by Each Strategy Examined

HBPM Strategy	Excellent Reliability for Mean BP*		Sufficient Agreement for Mean BP†		Excellent Reliability and Sufficient Agreement for Mean Home SBP and DBP	Good Agreement for Home Hypertension‡	Good Agreement for Home Hypertension‡ Using the New ACC/AHA High BP Guideline Threshold
	Home SBP	Home DBP	Home SBP	Home DBP			
Two morning and 2 evening	2	2	2	1	2	3	2
Single morning and single evening	3	3	2	1	3	3	3
Two morning	3	3	2	1	3	4	2
Single morning	3	4	3	1	4	4	3
Two evening	4	4	2	1	4	5	3
Single evening	4	4	3	1	4	6	5

ACC indicates American College of Cardiology; AHA, American Heart Association; DBP, diastolic blood pressure; HBPM, home blood pressure monitoring; SBP, systolic blood pressure.
*Intraclass (95% lower confidence limit) ≥0.80.
†≥85% of participants with an absolute difference in home blood pressure (BP) <10 mm Hg between week 1 and week 2.
‡$\kappa \geq 0.60$.

high BP guideline compared with the results not using these BP thresholds (≥135/85 mm Hg). Overall, the reliability of HBPM was greater when there was a higher prevalence of hypertension.

Study Strengths and Limitations

A major strength of this study is the diverse, community-based urban sample, which had a high representation of Hispanic and black individuals. The current study examined the reliability of HBPM using several different measurement strategies. Each of the strategies is practical to implement in clinical practice, thereby increasing the generalizability of our results. The study has several potential limitations. The mean clinic BP was 117/76 mm Hg and individuals taking antihypertensive medication were excluded. Therefore, the results may not be generalizable to individuals with treated hypertension or those with higher mean clinic BP. The average age of the study population was 42.3 years. Further, individuals with a history of chronic kidney disease were excluded and only a small number of enrolled participants had diabetes mellitus. Therefore, it is unclear whether the current results can be extended to populations at high CVD risk. The current study did not compare the reliability of HBPM with ABPM, and was not designed to examine the longer-term reliability of HBPM. Given the sample size, we were also unable to examine the reliability of HBPM strategies within subgroups defined by sex, age, or race. Finally, the study did not collect data on CVD events and we were unable to compare the association of mean home BP with CVD events using the different HBPM strategies.

Conclusions

Data from the current study suggest that the average of 2 morning and 2 evening readings or 1 morning and 1 evening reading over 3 days of HBPM are needed to reliably estimate mean home BP and diagnose out-of-clinic hypertension. A greater number of days was required to reliably estimate mean home BP and diagnose home hypertension for the other HBPM strategies. The results of the current study inform how patients should be instructed to conduct HBPM and will help guide clinicians in their interpretation of home BP data.

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SUPPLEMENTAL MATERIAL

Table S1. Difference in mean home systolic and diastolic blood pressure between Weeks 1 and 2 calculated using 2 morning readings or a single morning reading.

Number of days	Week 1	Week 2	Difference*	P value†
Mean (standard deviation) Systolic Blood Pressure, mm Hg				
2 Morning Readings				
7	114.6 (13.7)	114.8 (14.3)	-0.24 (5.34)	0.43
6	114.6 (13.9)	114.9 (14.5)	-0.28 (5.76)	0.39
5	114.6 (14.1)	114.8 (14.6)	-0.23 (6.18)	0.51
4	114.6 (14.2)	114.8 (15.1)	-0.16 (6.94)	0.68
3	114.6 (14.4)	114.7 (15.4)	-0.10 (7.82)	0.82
2	114.4 (14.4)	114.4 (15.5)	-0.05 (8.85)	0.93
1	114.4 (14.8)	114.6 (16.4)	0.46 (11.32)	0.51
Single Morning Reading				
7	115.5 (14.2)	115.7 (14.7)	-0.19 (5.78)	0.56
6	115.6 (14.3)	115.8 (14.9)	-0.22 (6.23)	0.54
5	115.6 (14.6)	115.6 (15.0)	-0.05 (6.63)	0.88
4	115.5 (14.6)	115.6 (15.6)	-0.09 (7.55)	0.83
3	115.5 (14.9)	115.6 (15.8)	-0.13 (8.50)	0.79
2	115.3 (15.1)	115.3 (16.2)	-0.04 (10.33)	0.95
1	114.9 (15.9)	115.5 (17.3)	-0.07 (13.12)	0.93
Mean (standard deviation) Diastolic Blood Pressure, mm Hg				
2 Morning Readings				
7	76.7 (9.4)	76.9 (9.7)	-0.21 (3.86)	0.34
6	76.7 (9.5)	76.9 (9.7)	-0.19 (4.01)	0.39
5	76.6 (9.7)	76.9 (9.8)	-0.21 (4.26)	0.37
4	76.7 (9.7)	76.7 (9.9)	-0.04 (4.81)	0.90
3	76.8 (9.8)	76.7 (10.1)	0.09 (5.58)	0.77
2	76.8 (10.1)	76.6 (10.1)	0.13 (6.76)	0.73
1	76.9 (10.7)	76.7 (11.0)	0.40 (8.73)	0.45
Single Morning Reading				
7	76.5 (9.6)	76.6 (9.8)	-0.05 (4.22)	0.84
6	76.6 (9.7)	76.6 (9.9)	-0.03 (4.43)	0.90
5	76.5 (10.0)	76.5 (10.0)	-0.02 (4.70)	0.95
4	76.6 (10.1)	76.5 (10.3)	0.10 (5.45)	0.73
3	76.7 (10.2)	76.4 (10.5)	0.26 (6.32)	0.47
2	76.7 (10.7)	76.3 (10.6)	0.39 (8.01)	0.40
1	76.7 (11.4)	76.1 (12.0)	0.49 (9.84)	0.42

*Mean Week 1 minus Mean Week 2

†P-value reflects whether the difference in mean blood pressure values between weeks 1 and 2 are different from zero.

Table S2. Difference in mean home systolic and diastolic blood pressure between Weeks 1 and 2 calculated using 2 evening readings or a single evening reading.

Number of days	Week 1	Week 2	Difference*	P value†
Mean (standard deviation) Systolic Blood Pressure, mm Hg				
2 Evening Readings				
7	116.2 (13.5)	116.2 (13.8)	0.0 (5.40)	1.0
6	116.2 (13.7)	116.2 (14.0)	0.0 (5.93)	0.99
5	116.3 (13.7)	116.2 (14.0)	0.12 (6.33)	0.74
4	116.2 (14.1)	116.0 (14.1)	0.24 (7.14)	0.55
3	116.4 (14.5)	115.9 (14.3)	0.50 (8.60)	0.30
2	116.1 (14.7)	115.5 (14.7)	0.46 (9.67)	0.41
1	115.4 (15.4)	115.0 (15.7)	0.43 (12.04)	0.57
Single Evening Reading				
7	117.3 (14.0)	117.5 (14.1)	-0.17 (6.10)	0.63
6	117.4 (14.2)	117.5 (14.2)	-0.16 (6.72)	0.68
5	117.5 (14.3)	117.5 (14.3)	-0.01 (7.17)	0.98
4	117.6 (14.7)	117.3 (14.6)	0.22 (8.08)	0.63
3	117.8 (15.2)	117.4 (15.0)	0.42 (9.73)	0.44
2	117.4 (15.4)	117.1 (15.5)	0.20 (11.17)	0.76
1	116.8 (16.3)	116.6 (16.7)	0.39 (13.39)	0.64
Mean (standard deviation) Diastolic Blood Pressure, mm Hg				
2 Evening Readings				
7	76.4 (9.3)	76.4 (9.3)	0.04 (3.99)	0.85
6	76.5 (9.4)	76.4 (9.4)	0.04 (4.34)	0.87
5	76.5 (9.4)	76.3 (9.4)	0.17 (4.70)	0.52
4	76.4 (9.7)	76.3 (9.5)	0.11 (5.17)	0.70
3	76.5 (9.8)	76.3 (9.7)	0.18 (6.27)	0.62
2	76.5 (10.0)	76.1 (10.4)	0.29 (7.27)	0.48
1	75.9 (10.0)	75.4 (11.1)	0.37 (8.60)	0.50
Single Evening Reading				
7	76.5 (9.5)	76.5 (9.4)	0.01 (4.47)	0.97
6	76.5 (9.7)	76.5 (9.5)	0.03 (4.88)	0.91
5	76.6 (9.7)	76.4 (9.5)	0.14 (5.26)	0.62
4	76.5 (10.0)	76.4 (9.6)	0.09 (5.69)	0.79
3	76.6 (10.1)	76.4 (9.9)	0.17 (6.87)	0.67
2	76.7 (10.2)	76.3 (10.7)	0.34 (8.14)	0.47
1	76.4 (10.5)	75.5 (11.5)	0.84 (9.68)	0.17

*Mean Week 1 minus Mean Week 2

†P-value reflects whether the difference in mean blood pressure values between weeks 1 and 2 are different from zero.

Table S3. Prevalence and agreement of home hypertension determined using morning readings.

		Home hypertension (%)*						
Number of days	**Week 1 or 2**	**Overall N (%)**	**Week 1: No Week 2: No**	**Week1: No Week 2: Yes**	**Week 1: Yes Week 2: No**	**Week 1: Yes Week 2: Yes**	**Kappa statistic (95% LCL)**	**Overall percentage agreement (95% LCL)**
2 Morning Readings								
7	Week 1 Week 2	63 (19.9%) 64 (20.3%)	74.1	6.0	5.7	14.2	0.64 (0.55)	88.3% (84.7%)
6	Week 1 Week 2	63 (19.9%) 67 (21.2%)	73.1	7.0	5.7	14.2	0.61 (0.52)	87.3% (83.7%)
5	Week 1 Week 2	62 (19.6%) 67 (21.2%)	73.4	7.0	5.4	14.2	0.62 (0.53)	87.7% (84.0%)
4	Week 1 Week 2	62 (19.6%) 63 (19.9%)	75.3	5.1	4.7	14.9	0.69 (0.61)	90.2% (86.9%)
3	Week 1 Week 2	63 (20.1%) 62 (19.7%)	72.8	6.6	7.0	13.0	0.57 (0.47)	86.3% (82.5%)
2	Week 1 Week 2	72 (23.6%) 60 (19.7%)	68.7	5.1	8.9	13.9	0.58 (0.48)	85.6% (81.6%)
1	Week 1 Week 2	72 (27.0%) 63 (23.6%)	54.4	7.3	10.1	12.7	0.46 (0.35)	79.4% (74.5%)
Single Morning Reading								
7	Week 1 Week 2	61 (19.3%) 64 (20.3%)	75.3	5.4	4.4	14.9	0.69 (0.61)	90.2% (86.9%)
6	Week 1 Week 2	63 (19.9%) 69 (21.8%)	73.4	6.6	4.7	15.2	0.66 (0.57)	88.6% (85.1%)
5	Week 1 Week 2	62 (19.6%) 68 (21.5%)	73.7	6.6	4.7	14.9	0.65 (0.56)	88.6% (85.1%)
4	Week 1 Week 2	69 (21.8%) 65 (20.6%)	73.1	5.1	6.3	15.5	0.66 (0.57)	88.6% (85.1%)
3	Week 1 Week 2	67 (21.3%) 66 (21.0%)	71.2	7.0	7.3	13.9	0.57 (0.48)	85.7% (81.8%)
2	Week 1 Week 2	75 (24.6%) 66 (21.6%)	66.5	6.3	9.2	14.6	0.55 (0.46)	83.9% (79.8%)
1	Week 1 Week 2	76 (28.5%) 69 (25.8%)	52.5	7.9	10.1	13.9	0.46 (0.36)	78.7% (73.7%)

*Mean home systolic BP ≥ 135 mm Hg or home diastolic BP ≥ 85 mm Hg.

Table S4. Prevalence and agreement of home hypertension determined using evening readings.

		Home hypertension (%)*						
Number of days	**Week 1 or 2**	**Overall N (%)**	**Week 1: No Week 2: No**	**Week1: No Week 2: Yes**	**Week 1: Yes Week 2: No**	**Week 1: Yes Week 2: Yes**	**Kappa statistic (95% LCL)**	**Overall percentage agreement (95% LCL)**
2 Evening Readings								
7	Week 1 Week 2	55 (17.4%) 61 (19.3%)	76.3	6.3	4.4	13.0	0.64 (0.55)	89.2% (85.8%)
6	Week 1 Week 2	60 (19.0%) 64 (20.3%)	74.7	6.3	5.1	13.9	0.64 (0.55)	88.6% (85.1%)
5	Week 1 Week 2	62 (19.6%) 64 (20.3%)	73.7	6.6	6.0	13.6	0.60 (0.51)	87.3% (83.7%)
4	Week 1 Week 2	58 (18.4%) 64 (20.3%)	73.7	7.9	6.0	12.3	0.55 (0.46)	86.1% (82.3%)
3	Week 1 Week 2	64 (20.4%) 68 (21.7%)	70.6	8.5	7.3	13.0	0.52 (0.42)	84.1% (80.0%)
2	Week 1 Week 2	65 (21.3%) 70 (23.0%)	67.4	8.5	7.0	13.6	0.53 (0.44)	83.9% (79.8%)
1	Week 1 Week 2	50 (20.0%) 46 (18.4%)	57.3	6.0	7.3	8.5	0.46 (0.34)	83.2% (78.6%)
Single Evening Reading								
7	Week 1 Week 2	63 (19.9%) 67 (21.2%)	74.1	6.0	4.7	15.2	0.67 (0.58)	89.2% (85.8%)
6	Week 1 Week 2	67 (21.2%) 72 (22.8%)	71.5	7.3	5.7	15.5	0.62 (0.53)	87.0% (83.3%)
5	Week 1 Week 2	68 (21.5%) 68 (21.5%)	71.2	7.3	7.3	14.2	0.57 (0.48)	85.4% (81.6%)
4	Week 1 Week 2	71 (22.5%) 68 (21.5%)	71.5	6.0	7.0	15.5	0.62 (0.53)	87.0% (83.3%)
3	Week 1 Week 2	75 (23.9%) 70 (22.3%)	67.4	8.2	9.8	13.9	0.49 (0.39)	81.8% (77.6%)
2	Week 1 Week 2	67 (22.0%) 76 (24.9%)	65.5	9.8	7.0	14.2	0.52 (0.42)	82.6% (78.4%)
1	Week 1 Week 2	54 (21.6%) 54 (21.6%)	54.7	7.3	7.3	9.8	0.46 (0.34)	81.6% (76.8%)

* Mean home systolic BP ≥ 135 mm Hg or home diastolic BP ≥ 85 mm Hg.

Table S5. Prevalence and agreement of home hypertension determined using morning and evening readings defined using the new BP thresholds recommended in the 2017 American College of Cardiology (ACC) / American Heart Association (AHA) High BP guideline.

		Home hypertension (%)*						
Number of days	**Week 1 or 2**	**Overall N (%)**	**Week 1: No Week 2: No**	**Week 1: No Week 2: Yes**	**Week 1: Yes Week 2: No**	**Week 1: Yes Week 2: Yes**	**Kappa statistic (95% LCL)**	**Overall Percentage agreement (95% LCL)**
2 Morning and 2 Evening Readings								
7	Week 1 Week 2	120 (38.0%) 113 (35.8%)	58.2	3.8	6.0	32.0	0.79 (0.73)	90.2% (86.9%)
6	Week 1 Week 2	118 (37.3%) 114 (36.1%)	58.2	4.4	5.7	31.6	0.78 (0.72)	89.9% (86.5%)
5	Week 1 Week 2	112 (35.4%) 114 (36.1%)	58.5	6.0	5.4	30.1	0.75 (0.69)	88.6% (85.1%)
4	Week 1 Week 2	117 (37.0%) 110 (34.8%)	57.6	5.4	7.6	29.4	0.72 (0.65)	87.0% (83.3%)
3	Week 1 Week 2	118 (37.3%) 110 (34.8%)	56.6	6.0	8.5	28.8	0.68 (0.61)	85.4% (81.6%)
2	Week 1 Week 2	125 (39.6%) 109 (34.5%)	54.4	6.0	11.1	28.5	0.63 (0.56)	82.9% (78.8%)
1	Week 1 Week 2	115 (37.6%) 105 (34.3%)	51.9	8.5	11.7	24.7	0.55 (0.46)	79.1% (74.5%)
Single Morning and Single Evening Reading								
7	Week 1 Week 2	120 (38.0%) 115 (36.4%)	58.2	3.8	5.4	32.6	0.80 (0.75)	90.8% (87.6%)
6	Week 1 Week 2	122 (38.6%) 117 (37.0%)	56.0	5.4	7.0	31.6	0.74 (0.67)	87.7% (84.0%)
5	Week 1 Week 2	120 (38.0%) 117 (37.0%)	56.3	5.7	6.6	31.3	0.74 (0.67)	87.7% (84.0%)
4	Week 1 Week 2	121 (38.3%) 116 (36.7%)	54.7	7.0	8.5	29.7	0.67 (0.60)	84.5% (80.5%)
3	Week 1 Week 2	122 (38.6%) 110 (34.8%)	55.1	6.3	10.1	28.5	0.65 (0.57)	83.5% (79.5%)
2	Week 1 Week 2	128 (40.5%) 115 (36.4%)	51.6	7.9	12.0	28.5	0.58 (0.50)	80.1% (75.7%)
1	Week 1 Week 2	123 (40.2%) 114 (37.3%)	49.4	8.5	11.4	27.5	0.57 (0.49)	79.4% (74.9%)

*Mean home systolic BP ≥ 130 mm Hg or home diastolic BP ≥ 80 mm Hg.

Table S6. Prevalence and agreement of home hypertension determined using morning readings defined using the new BP thresholds recommended in the 2017 American College of Cardiology (ACC) / American Heart Association (AHA) High BP guideline.

		Home hypertension (%)*						
Number of days	**Week 1 or 2**	**Overall N (%)**	**Week 1: No Week 2: No**	**Week 1: No Week 2: Yes**	**Week 1: Yes Week 2: No**	**Week 1: Yes Week 2: Yes**	**Kappa statistic (95% LCL)**	**Overall Percentage agreement (95% LCL)**
2 Morning Readings								
7	Week 1 Week 2	122 (38.6%) 117 (37.0%)	56.0	5.4	7.0	31.6	0.74 (0.67)	87.7% (84.0%)
6	Week 1 Week 2	125 (39.6%) 113 (35.8%)	56.6	3.8	7.6	32.0	0.76 (0.70)	88.6% (85.1%)
5	Week 1 Week 2	123 (38.9%) 109 (34.5%)	57.6	3.5	7.9	31.0	0.76 (0.69)	88.6% (85.1%)
4	Week 1 Week 2	127 (40.2%) 112 (35.4%)	56.0	3.8	8.5	31.6	0.74 (0.67)	87.7% (84.0%)
3	Week 1 Week 2	129 (41.1%) 116 (36.9%)	52.5	6.0	10.1	30.7	0.66 (0.59)	83.8% (79.7%)
2	Week 1 Week 2	126 (41.3%) 110 (36.1%)	50.3	6.3	11.4	28.5	0.61 (0.54)	81.6% (77.3%)
1	Week 1 Week 2	107 (40.1%) 95 (35.6%)	42.4	8.2	12.0	21.8	0.49 (0.40)	76.0% (70.9%)
Single Morning Reading								
7	Week 1 Week 2	116 (36.7%) 116 (36.7%)	57.3	6.0	6.0	30.7	0.74 (0.68)	88.0% (84.4%)
6	Week 1 Week 2	121 (38.3%) 116 (36.7%)	56.3	5.4	7.0	31.3	0.74 (0.67)	87.7% (84.0%)
5	Week 1 Week 2	122 (38.6%) 115 (36.4%)	56.0	5.4	7.6	31.0	0.72 (0.66)	87.0% (83.3%)
4	Week 1 Week 2	126 (39.9%) 112 (35.4%)	54.1	6.0	10.4	29.4	0.65 (0.58)	83.5% (79.5%)
3	Week 1 Week 2	128 (40.8%) 114 (36.3%)	52.2	6.6	11.1	29.4	0.62 (0.55)	82.2% (77.9%)
2	Week 1 Week 2	129 (42.3%) 111 (36.4%)	47.8	7.9	13.6	27.2	0.53 (0.45)	77.7% (73.0%)
1	Week 1 Week 2	116 (43.4%) 104 (39.0%)	38.6	9.2	13.0	23.7	0.46 (0.37)	73.8% (68.5%)

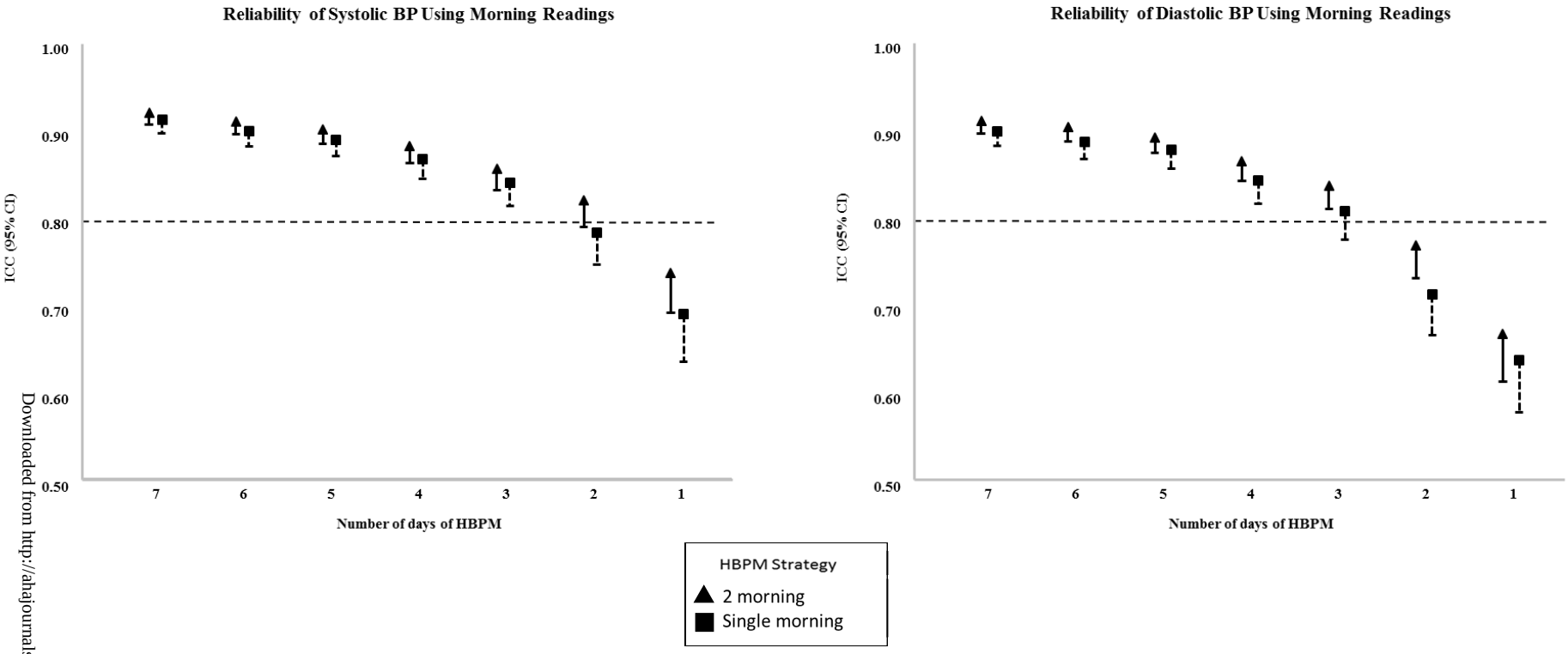
*Mean home systolic BP ≥ 130 mm Hg or home diastolic BP ≥ 80 mm Hg.

Table S7. Prevalence and agreement of home hypertension determined using evening readings defined using the new BP thresholds recommended in the 2017 American College of Cardiology (ACC) / American Heart Association (AHA) High BP guideline.

		Home hypertension (%)*						
Number of days	**Week 1 or 2**	**Overall N (%)**	**Week 1: No Week 2: No**	**Week 1: No Week 2: Yes**	**Week 1: Yes Week 2: No**	**Week 1: Yes Week 2: Yes**	**Kappa statistic (95% LCL)**	**Overall Percentage agreement (95% LCL)**
2 Evening Readings								
7	Week 1 Week 2	113 (35.8%) 113 (35.8%)	57.9	6.3	6.3	29.4	0.72 (0.66)	87.3% (83.7%)
6	Week 1 Week 2	117 (37.0%) 115 (36.4%)	56.3	6.6	7.3	29.7	0.70 (0.63)	86.1% (82.3%)
5	Week 1 Week 2	119 (37.7%) 111 (35.1%)	56.3	6.0	8.5	29.1	0.69 (0.62)	85.4% (81.6%)
4	Week 1 Week 2	114 (36.1%) 110 (34.8%)	57.3	6.6	7.9	28.2	0.68 (0.61)	85.4% (81.6%)
3	Week 1 Week 2	117 (37.3%) 104 (33.1%)	55.7	6.6	10.8	26.3	0.62 (0.54)	82.5% (78.3%)
2	Week 1 Week 2	108 (35.4%) 101 (33.1%)	52.5	9.8	12.0	22.2	0.50 (0.41)	77.4% (72.7%)
1	Week 1 Week 2	83 (33.2%) 80 (32.0%)	45.3	7.6	8.5	17.7	0.54 (0.44)	79.6% (74.6%)
Single Evening Reading								
7	Week 1 Week 2	116 (36.7%) 112 (35.4%)	56.3	7.0	8.2	28.5	0.67 (0.60)	84.8% (80.9%)
6	Week 1 Week 2	124 (39.2%) 114 (36.1%)	54.1	6.6	9.8	29.4	0.65 (0.58)	83.5% (79.5%)
5	Week 1 Week 2	125 (39.6%) 113 (35.8%)	53.8	6.6	10.4	29.1	0.64 (0.56)	82.9% (78.8%)
4	Week 1 Week 2	118 (37.3%) 120 (38.0%)	52.2	10.4	9.8	27.5	0.57 (0.49)	79.7% (75.3%)
3	Week 1 Week 2	124 (39.5%) 115 (36.6%)	50.6	9.5	12.3	26.9	0.53 (0.45)	78.0% (73.4%)
2	Week 1 Week 2	116 (38.0%) 110 (36.1%)	48.7	11.1	13.0	23.7	0.47 (0.38)	75.1% (70.2%)
1	Week 1 Week 2	97 (38.8%) 90 (36.0%)	38.9	9.5	11.7	19.0	0.43 (0.33)	73.2% (67.7%)

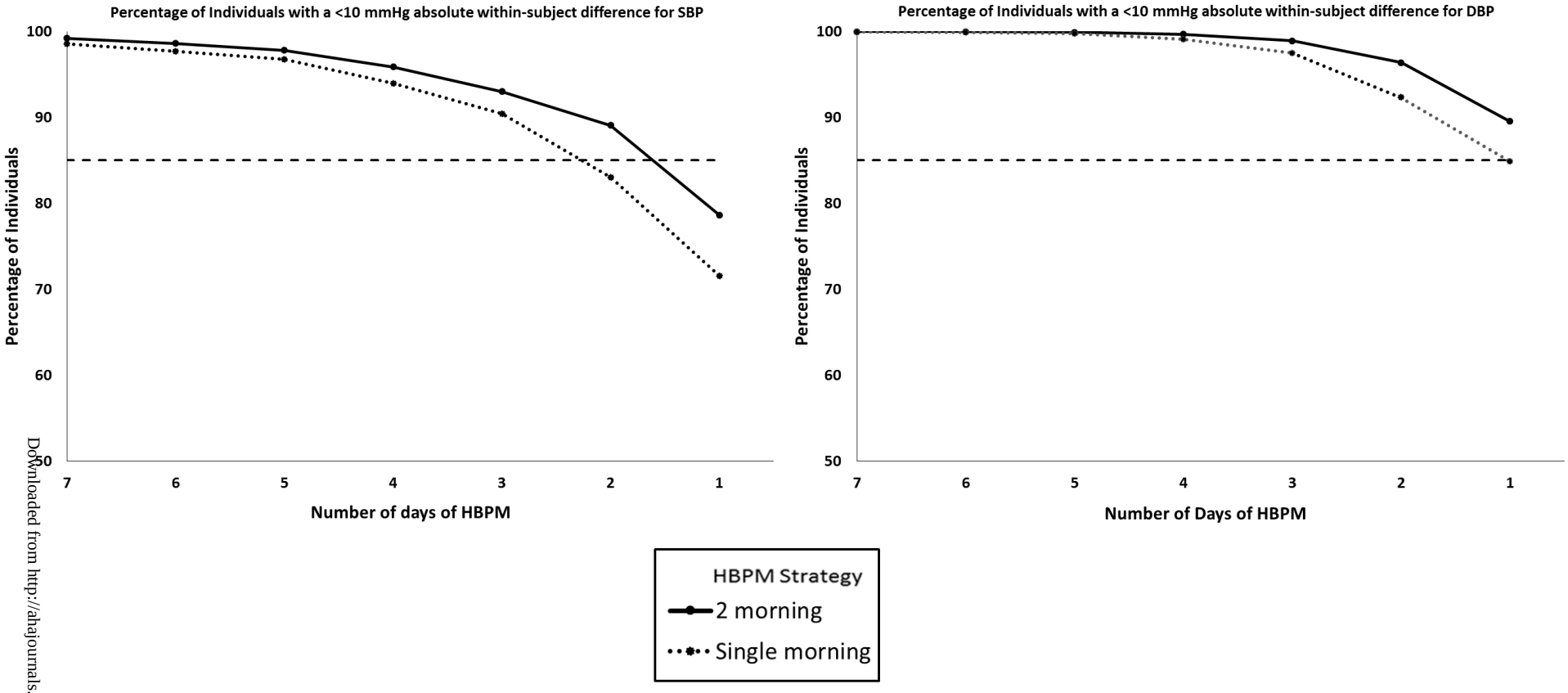
*Mean home systolic BP ≥ 130 mm Hg or home diastolic BP ≥ 80 mm Hg.

Figure S1. Reliability of mean home BP between Weeks 1 and 2 by number of days of HBPM using 2 morning readings or a single morning reading. Left panel, Reliability of HBPM for the estimation of systolic BP (ICC and 95% LCLs). Right panel, Reliability of HBPM for the estimation of diastolic BP (ICC and 95% LCLs).



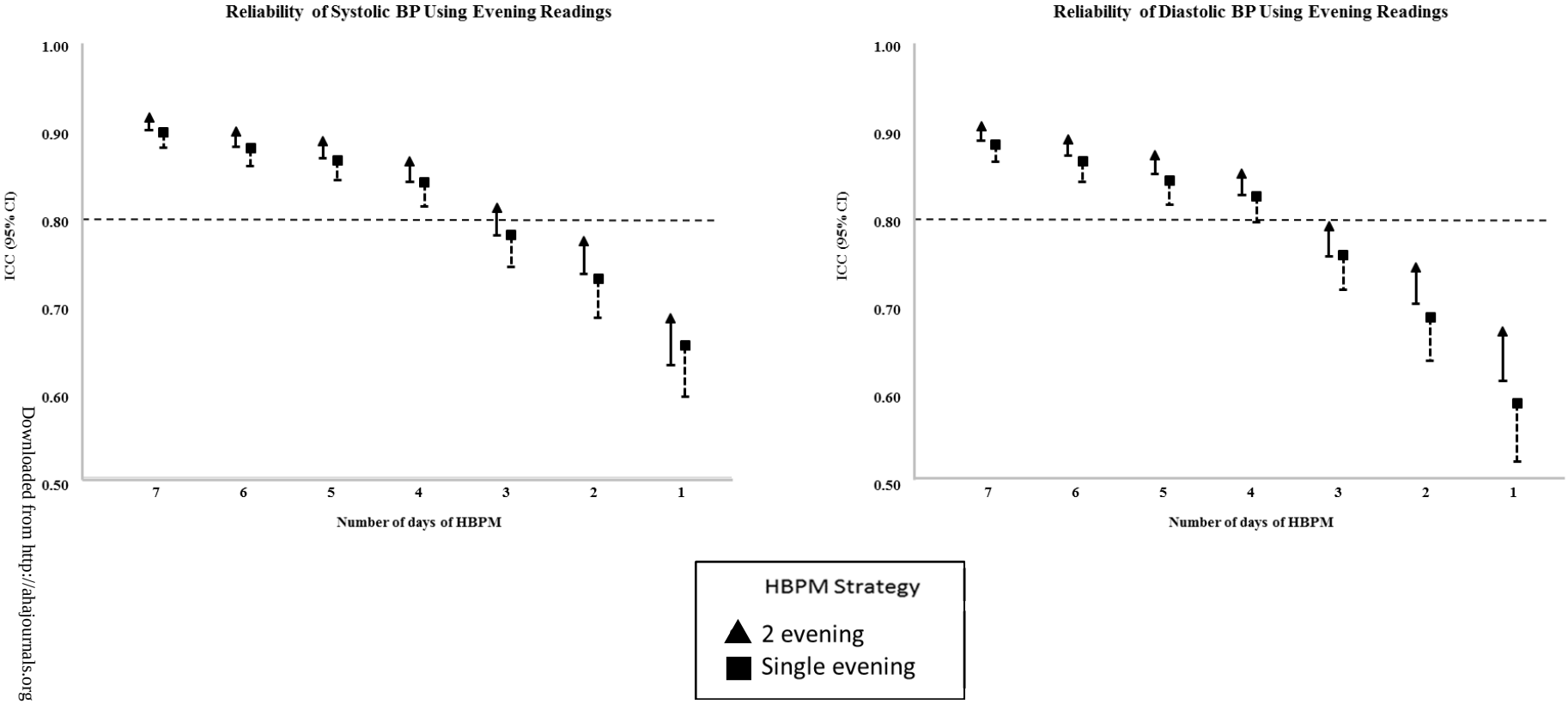
BP: blood pressure, HBPM: home blood pressure measurement, ICC: interclass correlation coefficient, LCL: lower confidence limit. Dashed line indicates 80% threshold for excellent agreement.

Figure S2. Percentage of participants with <10 mm Hg absolute difference between week 1 and week 2 mean home blood pressure when defining daily blood pressure using 2 morning readings or a single morning reading.



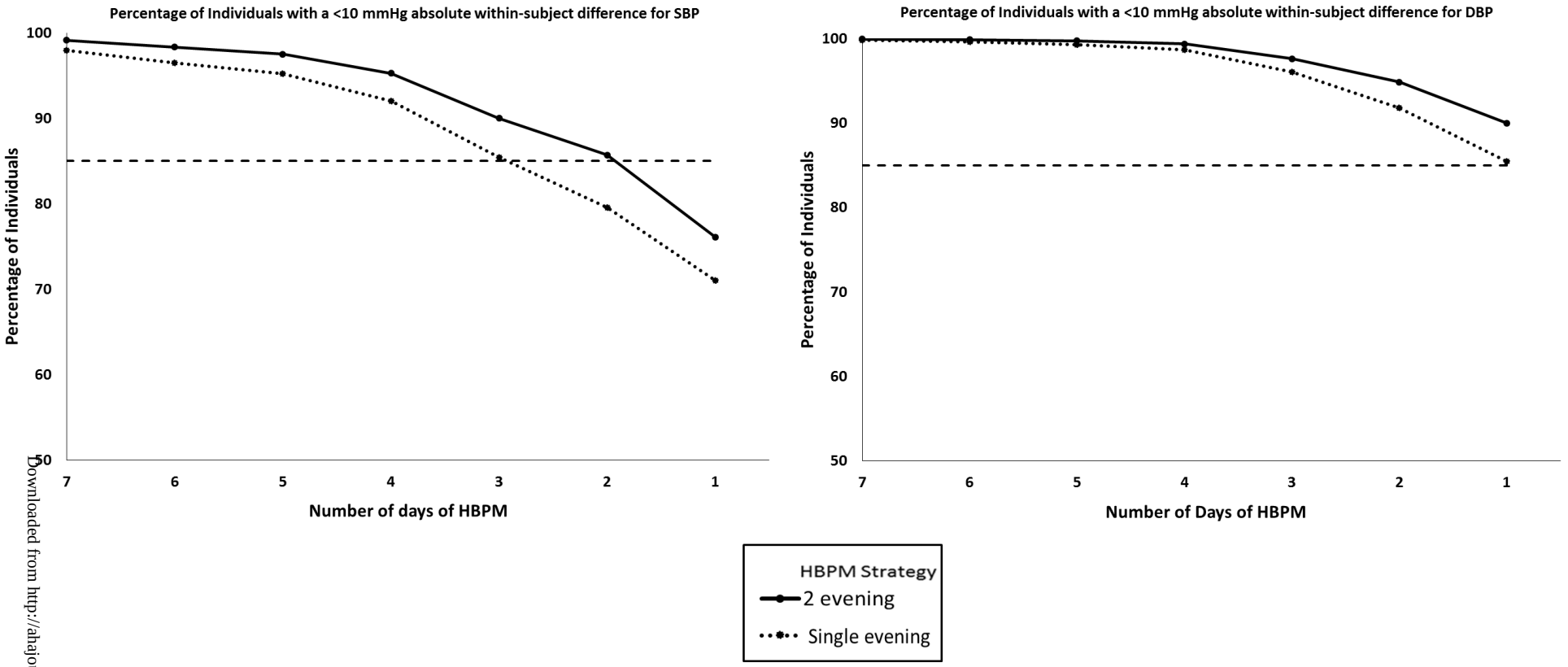
SBP: systolic blood pressure, DBP: diastolic blood pressure, HBPM: home blood pressure measurement. Dashed line indicates 85% threshold for agreement.

Figure S3. Reliability of mean home BP between Weeks 1 and 2 by number of days of HBPM using 2 evening readings or a single evening reading. Left panel, Reliability of HBPM for the estimation of systolic BP (ICC and 95% LCLs). Right panel, Reliability of HBPM for the estimation of diastolic BP (ICC and 95% LCLs).



BP: blood pressure, HBPM: home blood pressure measurement, ICC: interclass correlation coefficient, LCL: lower confidence limit. Dashed line indicates 80% threshold for excellent agreement.

Figure S4. Percentage of participants with <10 mm Hg absolute difference between week 1 and week 2 mean home blood pressure when defining daily blood pressure using 2 evening readings or a single evening reading.



SBP: systolic blood pressure, DBP: diastolic blood pressure, HBPM: home blood pressure measurement. Dashed line indicates 85% threshold for agreement.