World Journal of Advanced Research and Reviews
eISSN: 2581-9615 CODEN (USA): WJARAI
Cross Ref DOI: 10.30574/wjarr
Journal homepage: https://wjarr.com/

(RESEARCH ARTICLE)

Check for updates

Clinical audit on blood pressure measurement practices using the simple app in primary care institutions under the regional director of health services, Colombo, Sri Lanka

Piyumi Nethkala Edirisinghe [1,*], Yasas Kosala Samarasinghe [1] and Chathuri Udari Goonatillake [2]

[1] *Postgraduate Institute of Medicine, Colombo, Sri Lanka.*
[2] *Ministry of Health, Sri Lanka.*

World Journal of Advanced Research and Reviews, 2026, 30(02), 623-629

Publication history: Received on 01 April 2026; revised on 06 May 2026; accepted on 09 May 2026

Article DOI: https://doi.org/10.30574/wjarr.2026.30.2.1273

Abstract

Accurate blood pressure measurement is essential for reliable diagnosis of hypertension, treatment monitoring, and quality improvement in primary care. This clinical audit assessed adherence to standard blood pressure measurement and documentation practices among healthcare personnel using the Simple App in selected primary care institutions under the Regional Director of Health Services, Colombo, Sri Lanka. A descriptive clinical audit was conducted from August to October 2025 using a structured observation checklist based on national hypertension guidance and accepted blood pressure measurement principles. A total of 185 observations were assessed across 15 measurement and documentation components, generating 2,775 component-level fields. Overall adherence was 65.19%, with 1,809 components performed according to the audit criteria. High adherence was observed for correct cuff size, forearm support, mid-arm positioning at heart level, and correct documentation, each at 99.5%. Use of a validated digital blood pressure meter was observed in 90.3% of measurements. Major gaps were identified in the inquiry about recent smoking, exercise, or coffee intake (0.5%), inquiry about empty bladder (0.0%), taking two measurements from both arms (0.0%), provision of proper back support (24.9%), and allowing 3 to 5 minutes of seated rest before measurement (51.9%). Facility adherence ranged from 53.07% to 76.86%. The audit shows that documentation and several technical steps were strong, but patient preparation, repeat measurement, and clinic environment require targeted quality improvement

Keywords: Blood Pressure Measurement; Clinical Audit; Hypertension; Primary Care; Simple App; Sri Lanka

1. Introduction

Hypertension remains one of the most important modifiable risk factors for cardiovascular disease, stroke, chronic kidney disease, and premature mortality. In primary care, the diagnosis and follow-up of hypertension depend heavily on the accuracy of routine blood pressure measurement. A blood pressure value that is measured under non-standard conditions may be falsely high or falsely low, leading to misclassification of patients, unnecessary treatment escalation, delayed treatment initiation, or inappropriate reassurance. Therefore, blood pressure measurement is not a simple mechanical task, but a clinical procedure that directly influences patient safety, treatment quality, and health system performance [1-3].

Guideline-based blood pressure measurement includes several linked steps. Patients should be adequately prepared, seated quietly before measurement, positioned correctly, measured using a suitable cuff and a validated device, and the reading should be documented accurately and promptly. International and national recommendations also emphasize avoidance of recent smoking, exercise, and caffeine intake, confirmation of bladder status, arm support at heart level,

* Corresponding author: Piyumi Nethkala Edirisinghe

feet flat on the floor, legs uncrossed, and repeat measurement when clinically appropriate [1-3]. Although these steps appear simple, they can be difficult to perform consistently in crowded clinics where staff are managing high patient loads and multiple administrative tasks.

Primary care services in Sri Lanka play a central role in the long-term management of non-communicable diseases, including hypertension. Strengthening the quality of blood pressure measurement at the primary care level is particularly important because many patients require repeated visits, medication adjustments, and long-term monitoring. If the measured values are unreliable, the quality of downstream clinical decisions also becomes unreliable. This affects not only individual patient management but also program-level monitoring of hypertension control rates.

Digital health tools can support continuity of care by improving documentation, follow-up, and service monitoring. The Simple App has been introduced in Sri Lanka with the support of Resolve to Save Lives to facilitate digital recording of hypertension care data, including blood pressure readings and follow-up information [4,5]. However, the usefulness of a digital record depends on the accuracy of the original clinical measurement entered into the system. A well-designed digital platform cannot compensate for poor measurement techniques at the point of care. Therefore, quality assurance of blood pressure measurement practices is essential if Simple App data are to be used confidently for clinical decision-making, supervision, and service improvement.

This clinical audit was conducted in selected Primary Medical Care Institutions under the Regional Director of Health Services, Colombo, to assess adherence to standard blood pressure measurement and documentation practices among healthcare personnel using the Simple App. The specific objectives were to assess overall adherence to guideline-based measurement procedures, identify component-wise gaps in measurement practice, compare adherence across facilities, and propose practical quality improvement actions suitable for routine primary care settings.

2. Materials and Methods

2.1. Study design

A descriptive clinical audit design was used. The audit compared observed blood pressure measurement and documentation practices against predefined audit criteria and expected standards derived from national hypertension management guidance and accepted principles for accurate blood pressure measurement [1-3]. The audit was designed as a quality improvement activity rather than an interventional study. Its purpose was to identify practice gaps and generate actionable recommendations for strengthening routine service delivery.

2.2. Study setting and period

The audit was conducted from August to October 2025 in selected healthcare facilities under the Regional Director of Health Services, Colombo. The selected facilities included Primary Medical Care Units at Boralasgamuwa, Kaduwela, Wellampitiya, Sedawatta, and Madiwela, and Divisional Hospitals at Maligawatta and Thalangama. These facilities provide routine primary care services, including follow-up care for patients with hypertension and other non-communicable diseases. Quantitative facility-wise adherence analysis was based on the facilities where direct observation data were sufficiently reliable for comparison. At Divisional Hospital Thalangama, patient-led blood pressure measurement due to staff shortages was considered qualitatively because it affected the reliability of direct adherence comparison.

2.3. Audit population and sampling

The audit population included healthcare personnel responsible for measuring and documenting blood pressure among hypertensive patients attending routine clinic services in the selected facilities. Observations were made during ordinary clinic operations to reflect real-world practice rather than an idealized demonstration. Patients and staff were not individually identified in the audit database. A total of 185 blood pressure measurement observations were included in the quantitative analysis. Each observation was assessed against 15 components, producing 2,775 component-level fields for analysis.

2.4. Data collection tool and procedure

Data was collected using the BP Measurement Checklist Colombo Project, a standardized observation checklist developed from national hypertension guidance and accepted blood pressure measurement recommendations. The checklist was hosted on the Epicollect mobile application to support real-time data entry and aggregation across the

selected facilities. The use of a mobile data collection platform helped reduce delays in data compilation and allowed the audit team to maintain a uniform structure for observations across sites.

The checklist captured observable aspects of the blood pressure measurement process, including environmental conditions, patient preparation, patient positioning, equipment-related factors, repeat measurement practice, and documentation accuracy. Observers recorded whether each component was adhered to or not adhered to at the time of measurement. Correct documentation was assessed by comparing the observed measured value with the value entered or recorded after measurement. No personal identifiers of patients or healthcare personnel were collected.

2.5. Audit criteria and standards

Two main audit criteria were used. The first was adherence to correct blood pressure measurement techniques, including patient preparation, posture, cuff size, device use, arm position, repeat measurement, and measurement environment. The second was the accuracy of blood pressure recording, defined as immediate and correct documentation of the observed systolic and diastolic blood pressure readings without rounding or transcription error. The expected standard for both criteria was 100% adherence because each component contributes to the reliability of the clinical measurement.

Table 1 Audit criteria and expected standards

Audit criteria	Operational definition	Expected standard
Measurement technique	Patient preparation, posture, cuff size, arm position, repeat measurement, and measurement environment should follow guideline-based practice.	100% adherence
Recording accuracy	Observed systolic and diastolic blood pressure readings should be documented immediately and correctly, without rounding or transcription error.	100% accuracy

2.6. Variables assessed

Fifteen observable components were assessed: availability of a quiet environment, comfortable temperature in the measurement area, inquiry about smoking, exercise or coffee intake within 30 minutes, inquiry about empty bladder status, seated rest for 3 to 5 minutes, availability of seating with back support, absence of conversation during measurement, use of a validated digital blood pressure meter, use of the correct cuff size, forearm support, mid-arm positioned at heart level, feet flat on the floor, legs uncrossed, taking two measurements from both arms and correct documentation of the blood pressure reading.

2.7. Data analysis

Data was summarized using frequencies and percentages. Overall adherence was calculated by dividing the number of adhered components by the total number of observed component fields. Component-wise adherence was calculated separately for each of the 15 checklist items. Facility-wise adherence was calculated by dividing the number of adhered components in each facility by the total number of component fields observed in that facility. The findings were interpreted in relation to the expected audit standard of 100% adherence and converted into practical quality improvement priorities.

3. Results and Discussion

3.1. Overall adherence

A total of 185 blood pressure measurement observations were included in the quantitative analysis. Since each observation assessed 15 components, 2,775 component-level fields were evaluated. Of these, 1,809 components adhered to the audit criteria, giving an overall adherence of 65.19%. This indicates moderate adherence to standard practice and shows substantial room for quality improvement. The gap between the expected standard of 100% and the observed adherence of 65.19% demonstrates that blood pressure measurement quality cannot be assumed even when digital documentation is available.

Table 2 Overall adherence to standard blood pressure measurement practices

Metric	Total observed components	Total adhered components	Percentage
Adherence	2,775 fields	1,809 fields	65.19%

3.2. Component-wise adherence

Performance varied considerably across the 15 assessed components. Technical components that were clearly visible during measurement were generally better followed than preparatory steps that required questioning the patient or modifying the clinic workflow. Correct cuff size, forearm support, mid-arm positioning at heart level, and correct documentation each showed 99.5% adherence. Patient positioning was also relatively strong for feet placed flat on the floor (95.1%) and legs uncrossed (89.2%). Use of a validated digital blood pressure meter was observed in 90.3% of measurements.

In contrast, several clinically important components were poorly performed. Only one observation included inquiry about smoking, exercise, or coffee intake within 30 minutes, giving adherence of 0.5%. No observations included an inquiry about whether the bladder was empty. Similarly, no observations included taking two measurements from both arms. Only 51.9% of patients were allowed to sit for 3 to 5 minutes before measurement, and only 24.9% had proper seating with back support. These findings indicate that healthcare personnel were more consistent with the mechanical act of measuring blood pressure than with the full preparation and standardization process required for accurate measurement.

The missed patient preparation steps are important because they may influence the measured value and therefore affect treatment decisions. Recent physical activity, caffeine intake, smoking, bladder fullness, conversation, and inadequate rest can contribute to elevated or unstable readings. If these issues are not considered, clinicians may interpret a transiently elevated reading as poor blood pressure control. Conversely, inconsistent measurement conditions make it difficult to compare readings across clinic visits. For patients managed through the Simple App, this has a direct implication for the reliability of longitudinal digital blood pressure trends.

Table 3 Component-wise adherence to standard blood pressure measurement practices

Component	Adhered n (%)	Not adhered n (%)
Quiet environment available	134 (72.4)	51 (27.6)
Comfortable temperature maintained	134 (72.4)	51 (27.6)
Asked about smoking, exercise or coffee within 30 minutes	1 (0.5)	184 (99.5)
Asked whether the bladder was empty	0 (0.0)	185 (100.0)
Patient seated for 3 to 5 minutes before measurement	96 (51.9)	89 (48.1)
Proper seating with back support available	46 (24.9)	139 (75.1)
No conversation during measurement	154 (83.2)	31 (16.8)
Validated digital blood pressure meter used	167 (90.3)	18 (9.7)
Correct cuff size used	184 (99.5)	1 (0.5)
Forearm rested during measurement	184 (99.5)	1 (0.5)
Mid-arm positioned at heart level	184 (99.5)	1 (0.5)
Patient's feet flat on the floor	176 (95.1)	9 (4.9)
Patient's legs uncrossed	165 (89.2)	20 (10.8)
Two measurements were taken from both arms	0 (0.0)	185 (100.0)
Blood pressure reading documented correctly	184 (99.5)	1 (0.5)

3.3. Facility-wise adherence

Facility-level adherence ranged from 53.07% to 76.86%. Primary Medical Care Unit Madiwela recorded the highest adherence at 76.86%, followed by Primary Medical Care Unit Kaduwela at 74.20%, Primary Medical Care Unit Sedawatta at 70.83%, Primary Medical Care Unit Wellampitiya at 69.39%, and Primary Medical Care Unit Boralasgamuwa at 62.05%. Divisional Hospital Maligawatta recorded the lowest adherence at 53.07%. This variation suggests that adherence is influenced not only by individual staff knowledge but also by facility workflow, physical environment, availability of suitable seating, staffing patterns, and local supervisory practices.

The low adherence at Divisional Hospital Maligawatta was particularly related to the measurement environment and patient preparation. A quiet and comfortable measurement environment was not consistently available in that setting. In contrast, several Primary Medical Care Units achieved 100% availability of a quiet and comfortable environment during observations. These differences highlight the importance of facility-level arrangements. Even when staff members understand the correct procedure, inadequate space, crowding, or unsuitable clinic layout may prevent full adherence to the standard.

Table 4 Facility-wise adherence to standard blood pressure measurement practices

Health facility	Number observed	Adhered / total components	Adherence (%)
PMCU Boralasgamuwa	39	363 / 585	62.05
PMCU Kaduwela	40	445 / 600	74.20
DH Maligawatta	51	406 / 765	53.07
PMCU Wellampitiya	22	229 / 330	69.39
PMCU Sedawatta	16	170 / 240	70.83
PMCU Madiwela	17	196 / 255	76.86
Total	185	1,809 / 2,775	65.19

3.4. Implication for Simple App data quality

One of the strengths observed in the audit was the very high level of correct documentation. This is encouraging because accurate digital entry is essential for continuity of hypertension care. However, the audit also shows that documentation quality and measurement quality are separate but connected issues. A blood pressure reading may be entered correctly into the Simple App, but if the measurement was taken without adequate preparation, seating, or repeat measurement, the digitally stored value may still be clinically unreliable.

This distinction is important for program monitoring. Digital platforms can make data more visible, allow follow-up tracking, and support supervision, but they do not automatically improve the clinical technique used to generate the data. Therefore, the digital hypertension program should include periodic observation of measurement practice, not only review digital completeness. Combining the simple app data review with direct clinical audit would allow supervisors to identify whether poor control rates reflect true patient-level problems or measurement and workflow issues at the facility level.

3.5. Quality improvement priorities

The findings support several practical and low-cost interventions. First, refresher training should focus on the commonly missed steps rather than repeating only general theory. Staff should be reminded to ask about recent smoking, exercise, and coffee intake, confirm bladder status, allow adequate rest, and avoid conversation during measurement. Second, each facility should display a short blood pressure measurement checklist near the measurement area. Visual prompts are likely to be useful because many missed steps are simple but easily forgotten during busy clinics.

Third, facility managers should ensure that the blood pressure measurement area has appropriate seating with back support, a place for the arm to rest at heart level, and reduced noise or crowding. Fourth, the protocol for first-visit or initial assessment measurements should clearly state when two measurements from both arms are required and how the readings should be documented. Fifth, facilities should maintain an inventory of digital blood pressure devices and ensure that devices are validated, functional, and available with appropriate cuff sizes.

Staffing also requires attention. At Divisional Hospital Thalangama, patient-led blood pressure measurement was noted due to staff shortages. Self-measurement may be useful in some settings if patients are trained and supervised, but unstructured patient-led measurement in a busy clinic can compromise standardization. When self-measurement is unavoidable, facilities should provide clear patient instructions, staff supervision, and a designated measurement station. However, the preferred approach for routine clinical documentation should be measurement by trained healthcare personnel.

Table 5 Priority gaps and proposed quality improvement actions.

Priority area	Audit observation	Suggested corrective action
Patient preparation	Inquiry about smoking, exercise, or coffee intake was 0.5%; inquiry about an empty bladder was 0.0%.	Add mandatory checklist prompts and provide refresher training before clinic sessions.
Resting and seating	Only 51.9% of patients rested for 3 to 5 minutes, and only 24.9% had proper support.	Provide suitable chairs and designate a short resting area before measurement.
Repeat and dual-arm measurement	No observation included two measurements from both arms.	Introduce a practical first-visit measurement protocol and allocate time for repeated readings.
Measurement environment	Quiet and temperature-controlled environments were not consistently available across facilities.	Create a separate measurement corner or room with reduced crowding and noise.
Equipment validation	Use of validated digital meters was high overall but not universal.	Maintain a facility-level inventory and replace or validate devices regularly.
Staffing and supervision	Patient-led measurement at one facility reflected staff shortages and reduced standardization.	Ensure trained staff are available and provide structured patient guidance when self-measurement is unavoidable.

Limitations

This audit has several limitations. It was conducted in selected facilities under the Regional Director of Health Services, Colombo, and may not represent all primary care institutions in Sri Lanka. Observations were limited to the audit period and may have been influenced by routine clinic workload, staff availability, and facility-specific arrangements. Since the audit was based on direct observation, the presence of observers may have influenced staff behavior, although observation during routine service delivery was used to reduce this effect.

Another limitation is that the audit assessed adherence to the measurement process rather than clinical outcomes. The audit did not evaluate whether incorrect measurement practice led to specific treatment changes or patient-level blood pressure control outcomes. In addition, facility-level comparison was affected by non-standard patient-led measurement at one facility, which was considered qualitatively rather than included in the quantitative adherence table. Despite these limitations, the audit provides useful facility-level evidence for quality improvement because it identifies specific, observable, and correctable gaps in routine blood pressure measurement practice.

4. Conclusion

This clinical audit found moderate overall adherence to standard blood pressure measurement and documentation practices in selected primary care institutions under the Regional Director of Health Services, Colombo. Correct cuff size, forearm support, mid-arm positioning at heart level, use of digital meters, and documentation were generally strong. However, important gaps were identified in patient preparation, resting time, seating with back support, dual arm repeat measurement, and measurement environment. These gaps can affect the reliability of blood pressure values entered into the Simple App and used for clinical decision-making. Targeted staff training, improved clinic arrangements, validated equipment, adequate staffing, visual reminders, and periodic re-audit are recommended to strengthen the quality of hypertension care in primary care settings.

Compliance with ethical standards

Acknowledgments

The authors acknowledge the Regional Director of Health Services, Colombo, the participating healthcare facilities, and the healthcare personnel who supported the audit process. The authors also acknowledge the contribution of the Simple App program in strengthening digital hypertension care documentation.

Disclosure of conflict of interest

The authors declare that there are no financial or non-financial conflicts of interest related to this clinical audit

Statement of ethical approval

Administrative and ethical approvals were obtained from the relevant authorities before data collection. Participation was voluntary, and confidentiality of patients and healthcare personnel was maintained throughout the audit. No personal identifiable information was recorded in the audit database or manuscript.

Statement of informed consent

"Informed consent was obtained from all individual participants included in the study."

References

[1] Ministry of Health Sri Lanka. National Guideline for Management of Hypertension for Primary Health Care Providers. Colombo: Ministry of Health; 2021.

[2] Muntner P, Shimbo D, Carey RM, Charleston JB, Gaillard T, Misra S, et al. Measurement of blood pressure in humans: A scientific statement from the American Heart Association. Hypertension. 2019;73(5):e35-e66.

[3] World Health Organization. Guideline for the pharmacological treatment of hypertension in adults. Geneva: World Health Organization; 2021.

[4] Resolve to Save Lives. Turning the tide on blood pressure control in Sri Lanka. New York: Resolve to Save Lives; 2025.

[5] Simple. Simple app for healthcare workers. New York: Simple.org; 2025 [cited 2026 May 7]. Available from: https://www.simple.org/