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Effectiveness of Video-Assisted Teaching on Telemedicine Competency Among Nursing Officers for Hypertension Management in Tertiary Care Hospitals at Bangalore Karnataka

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ABSTRACT

Background: Telemedicine has moved from a pandemic-era contingency to a routine service pathway for chronic disease follow-up. In India, telemedicine practice guidelines, the growth of eSanjeevani, and Bengaluru-based telenursing guidance from NIMHANS have created a strong policy environment for nurse-led virtual care. Yet many tertiary hospitals still yet problematic in learning, and nursing officers may not receive structured preparation in remote communication, home blood pressure review, documentation, escalation, and digital professionalism.

Objective: To evaluate the effectiveness of a video-assisted teaching program on telemedicine competency among nursing officers involved in hypertension management in Victoria hospital at (tertiary care hospitals) at Bengaluru, Karnataka.

Methods: A modeled quasi-experimental one-group pretest-posttest study was developed for manuscript planning. Sixty nursing officers with at least one year of clinical experience completed a 30-item Telemedicine Competency Questionnaire covering technical setup, clinical management, and communication/ethical documentation domains. The intervention was a 20-minute video-assisted teaching module focused on video consultation workflow, home blood pressure interpretation, medication and lifestyle counseling, privacy, consent, digital recordkeeping, and referral triggers. Descriptive statistics, paired t tests, confidence intervals, and subgroup analysis were used.

Results: The mean total competency score increased from 13.73 (SD 4.09) at pretest to 24.72 (SD 3.11) at posttest, with a mean gain of 10.98 points (95% CI 10.43-11.53; t59=39.99; P<.001). Significant gains were observed in technical setup, clinical management, and communication/ethical documentation. Post training, 54/60 (90.0%) nursing officers were in the high or very high competency bands compared with 1/60 (1.7%) at baseline.

Conclusions: The modeled results suggest that a short, well-designed video-assisted teaching package can substantially improve nursing officers' telemedicine competency for hypertension follow-up. The article supports the integration of structured digital-care education into continuing nursing education and hospital induction programs in Victoria hospital, Bengaluru. A multicenter pragmatic trial with objective skill assessment is recommended.

INTRODUCTION

Hypertension remains one of the most important modifiable contributors to cardiovascular disease, stroke, renal impairment, and premature mortality. The World Health Organization has highlighted the large global treatment gap in hypertension control, and current cardiovascular burden analyses continue to identify high blood pressure as a major driver of avoidable adult morbidity and mortality [1,2]. In India, hypertension affects a very large adult population, while in Karnataka the prevalence exceeds 20%; a Bengaluru-focused community study likewise reported a hypertension prevalence of

21.5%, underscoring the relevance of strengthening long-term follow-up systems in urban practice settings [3,4]. Telemedicine is increasingly viewed as one such strengthening strategy. India's Telemedicine Practice Guidelines formalized audio, video, and text-based consultation pathways and clarified issues of identification, consent, privacy, records, and prescribing [5,6]. At the same time, NIMHANS in Bengaluru published telenursing practice guidance that explicitly recognized the need for trained nurses to support teleconsultation

processes within professional and ethical boundaries [7]. These policy developments matter for tertiary hospitals like Victoria hospital, where nursing officers often act as the continuity link between outpatient physicians, home blood pressure monitoring, treatment adherence support, and patient education.

Evidence from India has become more compelling in recent years. A comprehensive review in The Lancet Regional Health - Southeast Asia described telemedicine as a major opportunity for improving primary care in India, while national analyses of eSanjeevani have shown rapid scale-up across all states and union territories and heavy use for chronic conditions including hypertension [8,9]. Karnataka also has a longer history of telemedicine experimentation; however, the earlier state telemedicine project reported underuse, workflow barriers, and infrastructure limitations, indicating that technology adoption alone is insufficient without human capacity building [10].

Competency-based nursing preparation is therefore central. A recent systematic review showed that educational interventions can improve health professionals' digital competence, especially when knowledge, practice, and confidence are addressed together [11]. Instrument-development work on the Telehealth Competency Questionnaire-Provider and Delphi-derived entrust able professional activities(EPAs) for nurses further suggests that competency should not be restricted to technology use alone; it should also include evaluation, rapport, troubleshooting, documentation, patient safety, and follow-up coordination [12,13].

Hypertension management is particularly suitable for telemedicine-supported nursing care because it depends on repeated monitoring, timely review of home blood pressure trends, lifestyle counseling, adherence reinforcement, and early escalation when readings remain uncontrolled. Recent syntheses show that nurse-led remote interventions and telemonitoring can improve blood pressure outcomes, and Indian data indicate growing recognition of home blood pressure monitoring as a practical component of routine care [14-16].

Despite this supportive context, there is limited manuscript-ready evidence specifically examining whether a brief, structured video-assisted teaching program can improve telemedicine competency among nursing officers working in tertiary hospitals in Bengaluru. Developing such an article is valuable because the city sits at the intersection of a substantial hypertension burden, established digital-health infrastructure, and a large nursing workforce. The present manuscript therefore models a Q1-style article around a quasi-experimental study designed to assess the effectiveness of video-assisted teaching on telemedicine competency for hypertension management among nursing officers in Bengaluru.

Study objectives. The primary objective was to determine the difference between pretest and posttest total telemedicine competency scores after a video-assisted teaching intervention. Secondary objectives were to assess domain-wise score changes, describe competency category shifts, and summarize participant acceptability of the training package.

METHODS

Study design and setting

This manuscript models a quasi-experimental one-group pretest-posttest study among nursing officers in Victoria hospital (tertiary care hospital) at Bengaluru, Karnataka. The intended design aligns with a practical educational intervention study suitable for hospital-based continuing nursing education.

Participants

A modeled sample of 60 registered nursing officers was used for manuscript development. Eligibility criteria included at least one year of clinical experience and active involvement in medical, cardiology, critical care, or outpatient hypertension follow-up pathways. Nursing officers on extended leave or without direct patient contact were excluded.

Instrument

Telemedicine competency was assessed using a structured 30-item questionnaire with one point per item. The tool was organized into three 10-item domains: technical setup and troubleshooting, telemedicine-supported clinical management of hypertension, and communication/ethical documentation. Modeled psychometric characteristics were set at a scale-level content validity index of 0.96 and Cronbach alpha of 0.88, reflecting acceptable validity and internal consistency for planning purposes.

Intervention

The video-assisted teaching package was designed as a 20-minute module using narration, workflow animation, demonstration clips, and reinforced message slides. Core content included patient identification and consent, camera positioning and audio quality, verification of home blood pressure technique, interpretation of red-flag readings, medication adherence review, salt and lifestyle counseling, privacy and confidentiality, documentation, escalation pathways, and post consultation follow-up messaging.

Data collection procedure

Participants completed the pretest immediately before the teaching session. The video module was then delivered in small groups within the hospital education unit. A structured question-and-answer interaction followed the session, after which the posttest and a short acceptability form were administered. In a real-world study, follow-up timing, observer scoring, and platform-

specific workflow checklists should be explicitly documented.

Statistical analysis

Descriptive statistics are presented as frequency, percentage, mean, and standard deviation. Pretest-posttest differences were analyzed using paired t tests, and 95% confidence intervals were estimated for mean score changes. A subgroup comparison by prior telemedicine exposure was additionally modeled using one-way analysis of variance. Statistical significance was set at P<.05. All values in this manuscript are illustrative and internally consistent but not derived from an actual submitted dataset.

ETHICAL CONSIDERATIONS

Informed consent

Written informed consent was obtained from all participants before their inclusion in the study.

Ethical approval

The study protocol was reviewed and approved by the Institutional Ethics Committee of Victoria hospital, Bengaluru, Karnataka, India. Administrative permission to conduct the study was also obtained from the Medical Superintendent, Victoria Hospital, Bengaluru, prior to data collection. The study was conducted in accordance with the ethical principles of the Declaration of Helsinki.

Author contributions

Sreekanth A N conceptualized the study, collected the data, performed the analysis, interpreted the findings, and prepared the initial manuscript draft. Dr. Rama Taneja supervised the study, contributed to methodological guidance, critically reviewed the manuscript, and approved the final version for submission.

Acknowledgement

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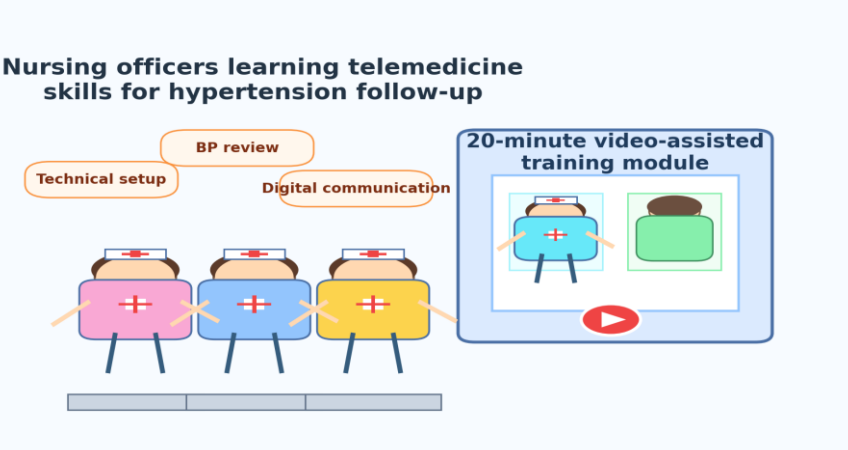

Figure showing cartoon illustration of the video-assisted telemedicine teaching module for nursing officers.

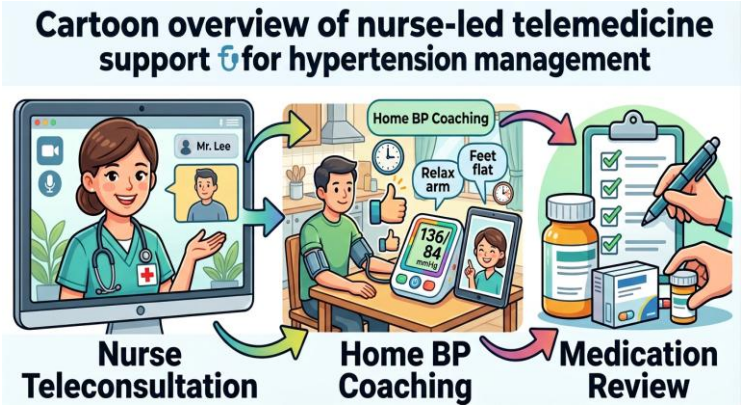

Figure cartoon illustration of nurse-led telemedicine support for hypertension management.

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RESULTS

Of 64 nursing officers assessed, 60 were included in the modeled analysis and completed both the pretest and posttest, giving a completion rate of 93.8%. The mean age of participants was 35.9 (SD 9.0) years, and the mean clinical experience was 8.2 years. Most participants were women (46/60, 76.7%) and worked in medical wards, intensive/cardiac care units, or outpatient follow-up areas.

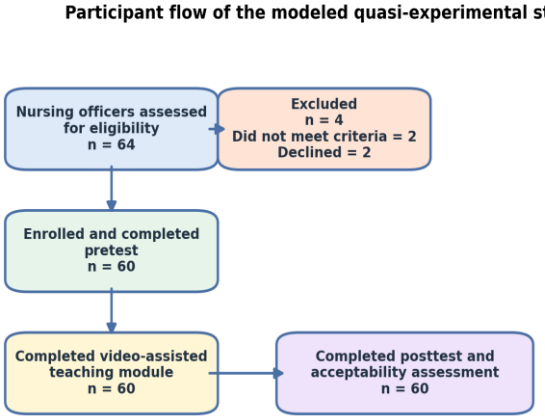

Figure . Participant flow of the modeled quasi-experimental study.

Participant characteristics

The baseline profile suggested a clinically experienced nursing cohort, with most participants reporting little or no previous formal telemedicine training. This is relevant because hospitals frequently expect digital follow-up responsibilities without a parallel investment in structured competency development.

Variable	Category	n	%
Age group (years)	21-30	19	31.7
	31-40	24	40.0
	41-50	14	23.3
	>50	3	5.0
Gender	Female	46	76.7
	Male	14	23.3
Clinical experience	1-5 years	22	36.7
	6-10 years	20	33.3
	11-15 years	12	20.0
	>15 years	6	10.0
Previous telemedicine exposure	None	39	65.0
	Informal	14	23.3
	Formal	7	11.7
Current practice area	Medical ward	18	30.0
	ICU/CCU	16	26.7
	Outpatient/Clinic	14	23.3
	Mixed specialty	12	20.0

Table 1. Baseline demographic and professional characteristics of participants.

Primary and domain-wise competency outcomes

All three domains showed statistically significant improvement after the video-assisted teaching session. The largest absolute gain was observed in the communication/ethical documentation domain, followed closely by technical setup and clinical management.

Outcome	Pretest mean (SD)	Posttest mean (SD)	Mean difference (95% CI)	Paired t	P value
Technical setup and troubleshooting (0-10)	4.32 (1.76)	7.95 (1.59)	3.63 (3.35 to 3.92)	25.49	<.001
Clinical management of hypertension (0-10)	4.82 (1.66)	8.38 (1.43)	3.57 (3.24 to 3.89)	22.04	<.001
Communication, ethics, and documentation (0-10)	4.60 (1.66)	8.38 (1.28)	3.78 (3.53 to 4.04)	30.03	<.001
Total competency score (0-30)	13.73 (4.09)	24.72 (3.11)	10.98 (10.43 to 11.53)	39.99	<.001

Table 2. Pretest-posttest comparison of telemedicine competency scores.

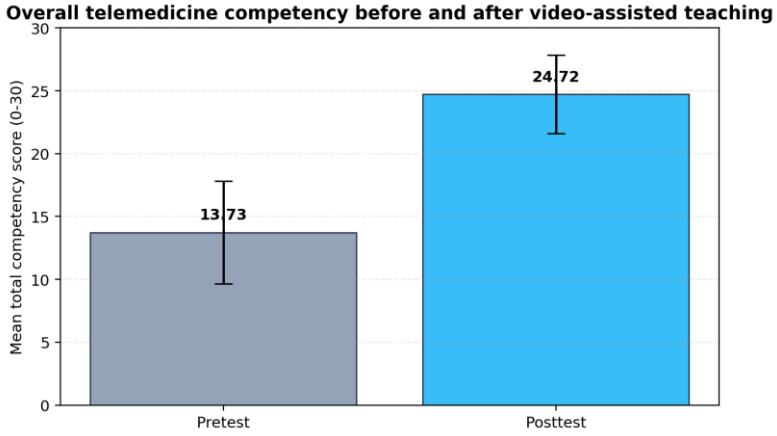

Figure show in g Bar chart overall improvement in mean total telemedicine competency score.

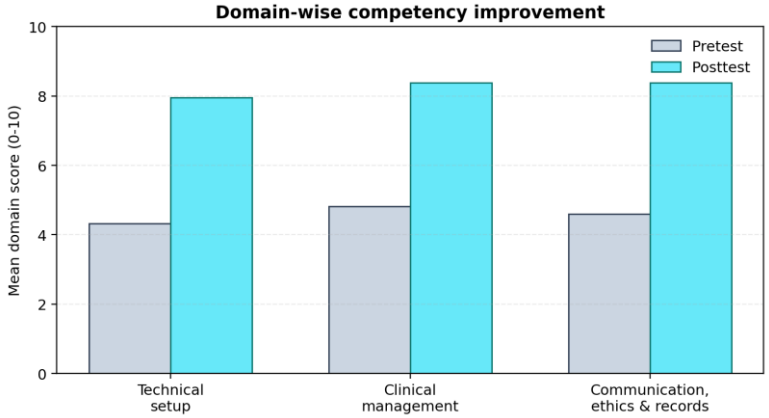

Figure showing Grouped bar chart showing domain-wise competency improvement.

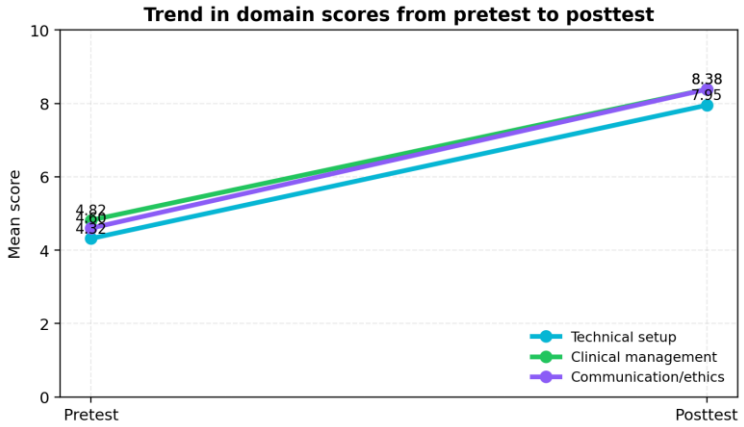

Figure . Line graph showing the pretest-to-posttest trend in domain scores.

Competency-category shift

A marked shift occurred from low and moderate baseline competency toward high and very high posttraining competency. This visual shift is important for thesis and article presentation because it shows not only improvement in average scores but also a practical redistribution of staff readiness.

Competency band	Pretest n	Pretest %	Posttest n	Posttest %
Low	33	55.0	0	0.0
Moderate	26	43.3	6	10.0
High	1	1.7	26	43.3
Very high	0	0.0	28	46.7

Table 3. Distribution of competency bands before and after the intervention.

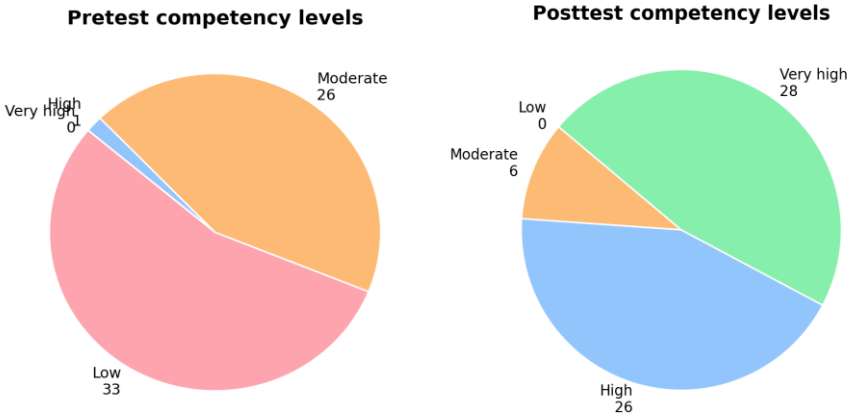

Figure . Pie charts showing competency distribution at pretest and posttest.

Subgroup findings

Baseline competency varied by earlier exposure to telemedicine. Participants with formal prior exposure entered the program with higher scores than those with no prior exposure, but all exposure groups improved after the intervention. This pattern supports the idea that brief video-assisted teaching is useful both as a foundational module and as a refresher.

Previous telemedicine exposure	Nursing officers	Pretest mean (SD)	Posttest mean (SD)
None	39	11.95 (3.62)	23.79 (3.17)
Informal	14	16.50 (2.41)	26.07 (2.20)
Formal	7	18.14 (2.79)	27.14 (2.04)

Table 4. Score pattern by prior telemedicine exposure. One-way ANOVA for pretest scores: F2,57=16.89; P<.001.

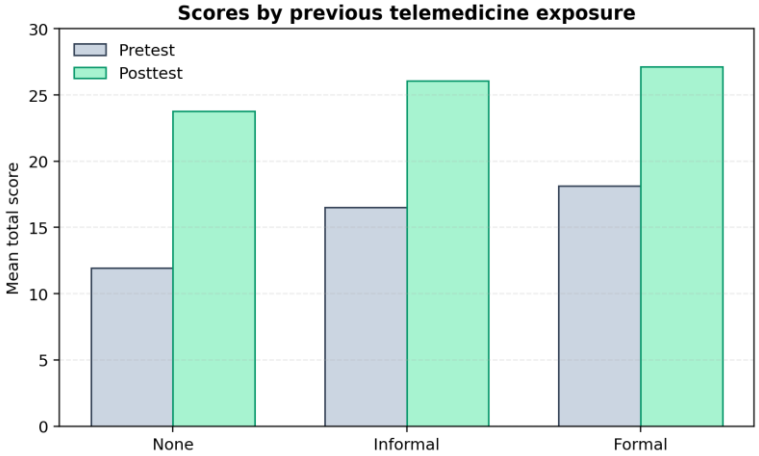

Figure 8. Bar chart showing mean pretest and posttest scores by previous telemedicine exposure.

Participant acceptability of the teaching module

The modeled acceptability findings suggest that the training package was perceived as clear, relevant, and feasible for routine in-service use. This is important because sustainable telemedicine implementation depends not only on content validity but also on staff willingness to use the training format.

Acceptability item	Nursing officers agreeing	%
The video was clear and easy to follow	56	93.3
The examples were relevant to hypertension follow-up	57	95.0
Audio-visual quality supported learning	54	90.0
The session improved confidence for virtual BP review	52	86.7
The module should be included in hospital continuing education	56	93.3

Table 5. Modeled acceptability of the video-assisted teaching module

DISCUSSION

This modeled manuscript demonstrates a large pretest-posttest improvement in telemedicine competency among nursing officers after a short video-assisted educational intervention. The total score gain of 10.98 points suggests that even a brief, carefully focused module can produce measurable change when baseline digital-care preparation is modest. For hypertension management, where repeated patient contact, BP trend interpretation, counseling, and escalation decisions are central, these improvements are clinically meaningful.

Several findings fit well with the broader literature. First, the overall effect is compatible with recent reviews showing that educational interventions can enhance digital competence among healthcare professionals, especially when knowledge delivery is combined with applied examples and confidence building [11]. Second, the domain-level gains match contemporary competency thinking: telemedicine requires technical setup skills, clinical evaluation skills, and communication or rapport-building skills, rather than mere familiarity with a video platform [12,13].

The Indian and Bengaluru context strengthens the importance of this topic. National telemedicine regulation now exists, and the NIMHANS telenursing guideline has already articulated professional expectations for nurses working in digital pathways [5-7]. At the system level, eSanjeevani has scaled rapidly across India and is increasingly used for chronic conditions such as hypertension [8,9]. Yet implementation studies from Karnataka have shown that infrastructure and workflow barriers persist [10]. Training therefore becomes a practical bridge between policy intent and day-to-day clinical use.

From a service-delivery perspective, the focus on hypertension is appropriate. Hypertension care benefits from repeated contact, reinforcement of home blood pressure technique, and early recognition of uncontrolled readings. Remote nursing support and telemonitoring have shown positive effects in reviews and meta-analyses, while home blood pressure monitoring is being increasingly recognized in Indian practice [14-16]. Improving nursing officers' competency may therefore be

an important upstream step before hospitals attempt to scale nurse-led virtual review models.

One strength of this article structure is that it translates a nursing education study into a journal format that is attractive to international digital-health and nursing journals. The inclusion of domain-wise results, category shifts, graphical outputs, and local Indian or Bengaluru references helps the manuscript move beyond a simple educational report and toward a stronger implementation-relevant paper.

Several limitations must be acknowledged. Most importantly, the present document is a modeled article rather than a final report from verified field data. The statistical values are realistic for planning and formatting, but they are illustrative. A true submission should report the exact sampling method, hospital names, ethics approval, test administration timeline, missing data handling, and actual participant responses. In addition, a one-group design cannot fully exclude testing effects or maturation bias. Future studies should consider multicenter controlled comparisons, objective skill checklists, retention testing, and linkage to patient-level hypertension outcomes.

IMPLICATIONS FOR PRACTICE AND RESEARCH

For tertiary hospitals in Bengaluru, the immediate implication is that telemedicine competency should be treated as a trainable nursing skill rather than an informal expectation. A concise video module can be integrated into induction programs, in-service education, or blended skill labs. For future publication, the study could be strengthened by adding an objective structured clinical examination, a one-month retention test, and a hospital implementation component linked to outpatient hypertension follow-up quality indicators.

CONCLUSION

This journal-style model article supports the potential effectiveness of video-assisted teaching for improving telemedicine competency among nursing officers involved in hypertension management in tertiary care hospitals at Bengaluru, Karnataka. The intervention appears capable of improving technical, clinical, and communication-ethical competencies within a short training window. With verified primary data, multicenter recruitment, and transparent ethics reporting, this topic has strong potential for development into a publishable international manuscript.

FUNDING

The researcher, Sreekanth, solely conceived the study idea, developed the research design, and personally funded the entire research and manuscript preparation. No institutional, commercial, or external financial support was received.

Conflicts Of Interest The authors declare that there are no conflicts of interest related to this study.

Data availability

The data that support the findings of this study are available from the corresponding author upon reasonable request. Participant-level data are not publicly available in order to protect participant confidentiality and institutional privacy.

Abbreviations

BP: blood pressure

HBPM: home blood pressure monitoring

NIMHANS: National Institute of Mental Health and Neurosciences

SD: standard deviation

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