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Feasibility and Uptake of a Blood Pressure Monitoring Kiosk in a Medical College Hostel: A Pilot Study

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Abstract

Background

Self-monitoring of blood pressure (BP) may provide an opportunity to promote cardiovascular health awareness among students. However, evidence regarding the implementation and utilisation of BP monitoring kiosks in hostel settings is limited. Hence, this pilot study aimed to evaluate the short-term operational practicality, initial uptake versus one-month utilization patterns, and measurement completeness of hostel-based BP monitoring kiosks, alongside an exploratory comparison of recorded BP profiles between boys' and girls' hostels.

Methods

A pilot observational study was conducted at All India Institute of Medical Sciences, Deoghar, Jharkhand, India, using BP monitoring kiosks installed in the boys' and girls' hostels. An automatic BP monitor, OMRON HEM-7120 (Omron Healthcare, Vietnam), was used for the study. The kiosk setting was composed of a chair, a table, the BP monitor and its power adapter, a register and pen, and an instruction banner (on the wall). Residents were informed about the availability of the kiosk facility via WhatsApp. After one month of unsupervised recording, data were analysed descriptively to assess date-wise utilisation, measurement frequency, and completeness of readings. The mean systolic BP, diastolic BP, and pulse rate were compared between the two hostel settings.

Results

Both kiosks were installed in the respective hostel settings and used for BP monitoring during the subsequent one-month study period, without any reported technical or operational difficulties. A total of 94 measurement sessions were recorded, comprising 70 (74.47%) in the boys' hostel and 24 (25.53%) in the girls' hostel. Of the total hostel residents, 69 (first-time measurement) of 241 male residents (28.63%) and 22 (first-time measurement) of 217 female residents (10.14%) measured their BP. The highest utilisation occurred on the installation day, accounting for 44 sessions (46.81%), followed by a substantial decline in daily use. Three BP measurements were recorded in 75 sessions (79.79%). All 24 records from the girls' hostel contained three measurements, compared with 51 of 70 records from the boys' hostel (72.86%).

Conclusion

Hostel-based BP monitoring kiosks were successfully deployed in both hostel settings, demonstrating preliminary operational practicality in a low-resource environment. However, the sharp decline in utilization after installation and differences in completeness emphasize that short-term technical practicality does not equate to sustained engagement. Prospective studies using formal feasibility criteria, usability metrics, and engagement strategies are required to evaluate long-term sustainability.

Categories: Medical Education, Internal Medicine, Healthcare Technology
Keywords: blood pressure, blood pressure monitoring, feasibility, health behavior, health promotion, health-seeking behavior, hostel, india, medical students, self-monitoring

Introduction

Hypertension is a major modifiable risk factor for cardiovascular disease, stroke, chronic kidney disease, and premature mortality [1]. Despite the availability of effective preventive and therapeutic interventions, its detection and control remain important public health challenges [2]. Globally, an estimated 1.3 billion adults are living with hypertension, with its prevalence reaching approximately 28% in South Asia [3]. An analysis of the National Family Health Survey-4 reported hypertension in 13.8% of young adults, while only 51.1% of those identified as having hypertension were aware of their status and 19.5% had sought treatment [4].

Regular blood pressure (BP) measurement can facilitate the identification of previously unrecognised elevated BP and encourage individuals to seek appropriate medical evaluation. However, conventional measurement opportunities generally depend on visiting a healthcare facility or participating in an organised screening programme [5]. Self-service BP monitoring kiosks offer an alternative by allowing individuals to measure their BP independently at accessible locations [6]. Evidence from healthcare and public settings suggests that such kiosks may support opportunistic screening and long-term monitoring [7].

Medical college hostels provide a potentially suitable setting for implementing such an intervention. Students residing in hostels share a living environment and have repeated access to common facilities, creating an opportunity to introduce health-monitoring resources into their daily routines. Although medical students are exposed to health-related knowledge during their training, this does not necessarily translate into regular personal health monitoring [8]. A conveniently located BP monitoring kiosk may potentially reduce accessibility barriers to BP measurement.

Although BP kiosks have been investigated in healthcare facilities and other public settings [9], their implementation in medical college hostels represents a distinct context in which access, utilisation patterns, and practical challenges may differ. Therefore, the present study aimed to assess the feasibility and uptake of a self-service BP monitoring kiosk installed in a medical college hostel, with the broader objective of exploring its potential as an accessible health-monitoring resource for hostel residents.

Materials And Methods

Ethics approval

The study was conducted after obtaining approval from the Institutional Ethics Committee (IEC) of the All India Institute of Medical Sciences (AIIMS), Deoghar (2026-SRF-03-06; date of approval: 02 July 2026). Necessary administrative permissions were obtained before initiating the study. The study period for BP kiosk deployment was from 24 August 2026 to 23 September 2026.

Selection and procurement of the blood pressure monitor

Information on suitable BP monitoring devices was obtained from the STRIDE BP website (https://www.stridebp.org/), which provides information on validated BP monitors [10]. Subsequently, e-commerce platforms were searched, and BP monitors were procured. During the search, BP monitors with a power adapter were selected to facilitate continuous use and minimise the inconvenience associated with frequent battery replacement. We used the OMRON HEM-7120 (Omron Healthcare, Vietnam) automatic BP monitor for BP and pulse rate measurements. The device was fitted with a standard adult medium cuff (OMRON HEM-CR24) accommodating upper-arm circumferences of 22-32 cm. The device has a BP measurement range of 0-300 mmHg, with an accuracy of ±3 mmHg, and a pulse rate measurement range of 40-180 beats/min, with an accuracy of ±5% of the displayed reading.

Development of educational materials

Educational materials on home BP monitoring were prepared after consulting relevant guidance on the appropriate use of home BP monitoring devices [11-13]. The materials were designed to provide clear instructions on the measurement procedure and were printed on a banner measuring 2 × 3 feet for display near the monitoring facility. The material used in this study is shown in Figure *1*.

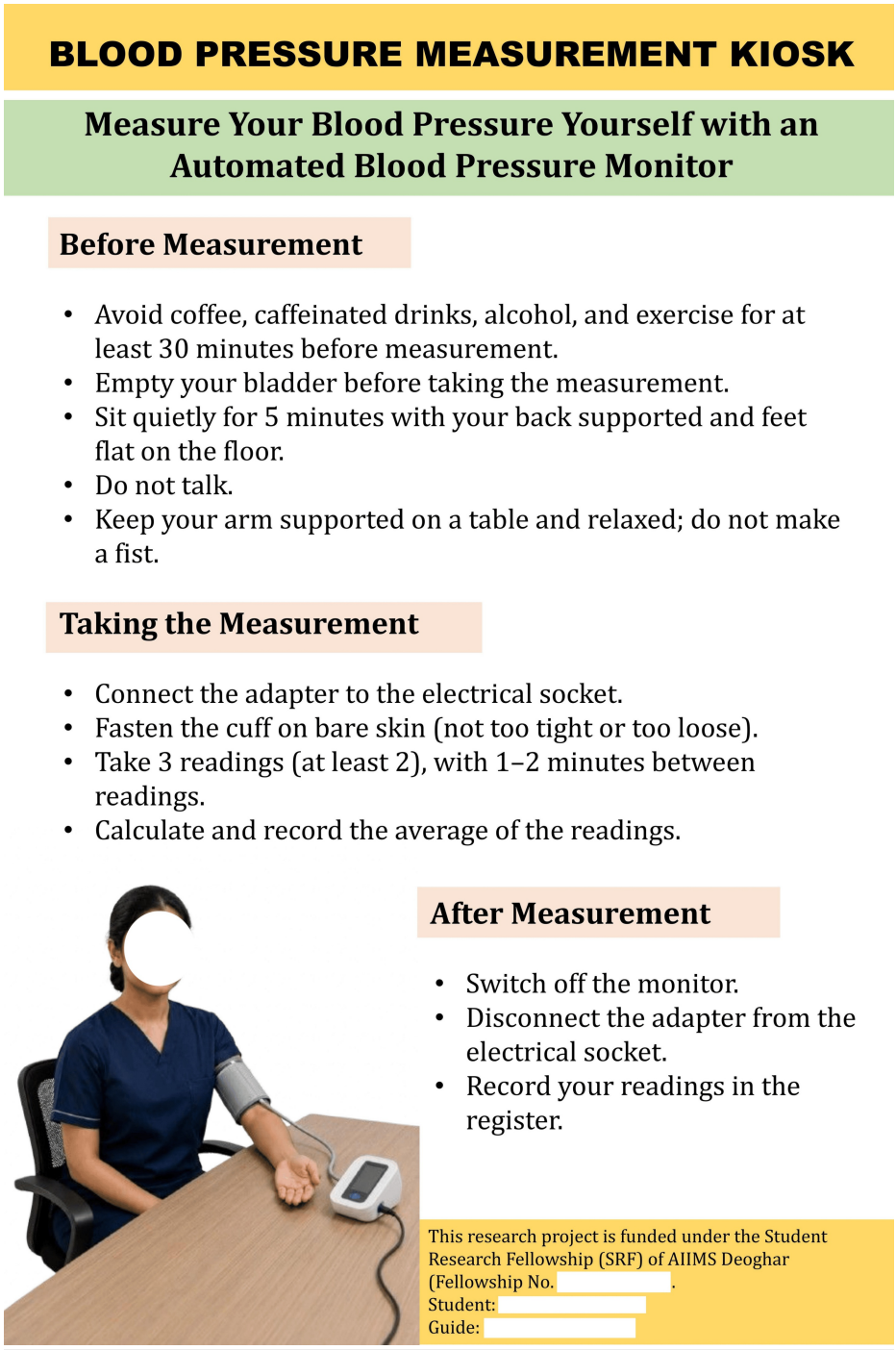


FIGURE 1: Instructions hung on a wall for guiding the student on the method of measurement

The figure was created by Dr. Himel Mondal and Vaishaali TM, after consulting existing literature [11-13], and the person seen in the figure is over 18 years of age and provided written consent for using her image.

Administrative permission

Permission to install the BP monitoring facility was obtained from the hostel provosts of both the boys' and girls' hostels. The installation was undertaken in coordination with the relevant hostel authorities.

Installation of the monitoring facility

The BP monitoring facility was established on the ground floor of each hostel in an area with access to electricity and the presence of a security officer. Chairs and tables available in the institutional inventory were utilized to establish the facility. The BP monitors were connected to electrical adapters to facilitate

routine use. Educational materials were displayed near the facility to guide users during measurement.

The facilities were inspected on alternate days throughout the one-month study period to monitor routine operational practicality. During these visits, investigators checked device power supply, adapter connections, cuff integrity, and the physical availability of recording pens and register sheets. Unscheduled downtime, device malfunctions, or structural accessibility barriers were tracked through alternate-day direct inspections and verbal debriefs with stationed security staff. However, predefined formal quantitative feasibility progression criteria (such as prospective benchmark targets for sustained daily utilization rates or device downtime thresholds) were not established a priori.

Participant recruitment and voluntary participation

Students residing in the boys' (n = 241) and girls' hostels (n = 217) were informed about the installation of the BP monitoring kiosk through their respective hostel WhatsApp groups. The communication explained the purpose of the kiosk and invited students to measure their BP and participate in the research project voluntarily. It was explicitly stated that the kiosk installation was part of a research study, participation in BP measurement was entirely voluntary, and written informed consent was obtained from participants.

Recording of blood pressure measurements

A register was maintained at each monitoring facility to document utilization and BP measurements. Users were requested to record basic details, including name, age, first-time/repeated measurement, mobile number, along with their BP and pulse rate readings. As the students may face difficulty in entering data, two readings were already entered in each register (Table *1*). The register served as the primary source of data for assessing utilization of the monitoring facility during the study period. There was a field on the form for collecting data regarding the measurement type (first-time or repeated). Each separate occasion a student sat at the kiosk and logged BP was designated as a measurement session. When an individual recorded more than one session during the study month, only their first session was analyzed for baseline student BP characteristics to ensure statistical independence, while all sessions were included in kiosk utilization and uptime calculations.

Date	Name	Age (years)	Mobile number	First/repeated measurement?	First measurement (mm Hg) (systolic/diastolic)	Pulse (bpm)	Second measurement (mm Hg) (systolic/diastolic)	Pulse (bpm)	Third measurement (mm Hg) (systolic/diastolic)	Pulse (bpm)	Average (mm Hg) (systolic/diastolic)	Average pulse (bpm)	Signature: agreement for voluntary participation and sharing information
22/08/2026	Himel Mondal	18	X	First	120/80	80	123/92	82	134/81	78	126/84	80	X
23/08/2026	Himel Mondal	18	X	Repeated	124/82	62	126/87	64	128/83	62	126/84	63	X
-	-	-	-	-	-	-	-	-	-	-	-	-	-

TABLE 1: Data entry sheet printed on the register

Empty cells with a hyphen (-) in the table indicate space for entering data. X is a placeholder. The two example data in the table cells were dummy data entered before starting the study. The data is not a part of the analysis.

Data confidentiality and de-identification

To protect participant confidentiality in shared hostel areas, the physical registers were stationed near the ground-floor security desk under routine visual oversight of the hostel security guard. Participants voluntarily logged their details and provided written consent by signing the register row. Direct identifiers (names and mobile numbers) were collected solely to verify measurement uniqueness and track repeated measurements across sessions. Upon completion of the study, the physical registers were retrieved and secured in a locked office accessible only to the investigators. Before electronic transcription and statistical analysis, all data were fully de-identified by replacing names and phone numbers with unique study identification codes (e.g., BH-001, GH-001). The master key linking participant names to ID numbers was maintained separately and destroyed following final data verification.

Data collection

At the end of one month, the registers were collected, and the recorded data were reviewed and analysed to describe the utilization of the monitoring facilities during the study period.

Statistical analysis

Statistical analysis was performed using descriptive and inferential statistics. Categorical variables were summarized as frequencies and percentages, while continuous variables were expressed as mean and standard deviation (SD). Date-wise utilization of the BP monitoring kiosks and the completeness of measurements were described separately for the boys' and girls' hostels. Differences in mean systolic BP, diastolic BP, and pulse rate between the two hostels were assessed using an independent-samples t-test. Differences across the first, second, and third measurements were assessed using repeated-measures analysis of variance (ANOVA), where appropriate [14]. For ANOVA, analyses were conducted only where three measurements were completed. Statistical significance was set at a p-value of less than 0.05. We used GraphPad Prism 9.5.0 (GraphPad Software, LLC, Boston, USA) for statistical analysis.

Results

BP monitoring kiosks were deployed in the boys' and girls' hostels on 24 August 2026. Both kiosks were installed in the respective hostel settings and used for BP monitoring during the subsequent one-month study period, without any reported technical or operational difficulties. A resident of the boys' hostel measuring his BP is shown in Figure *2*.

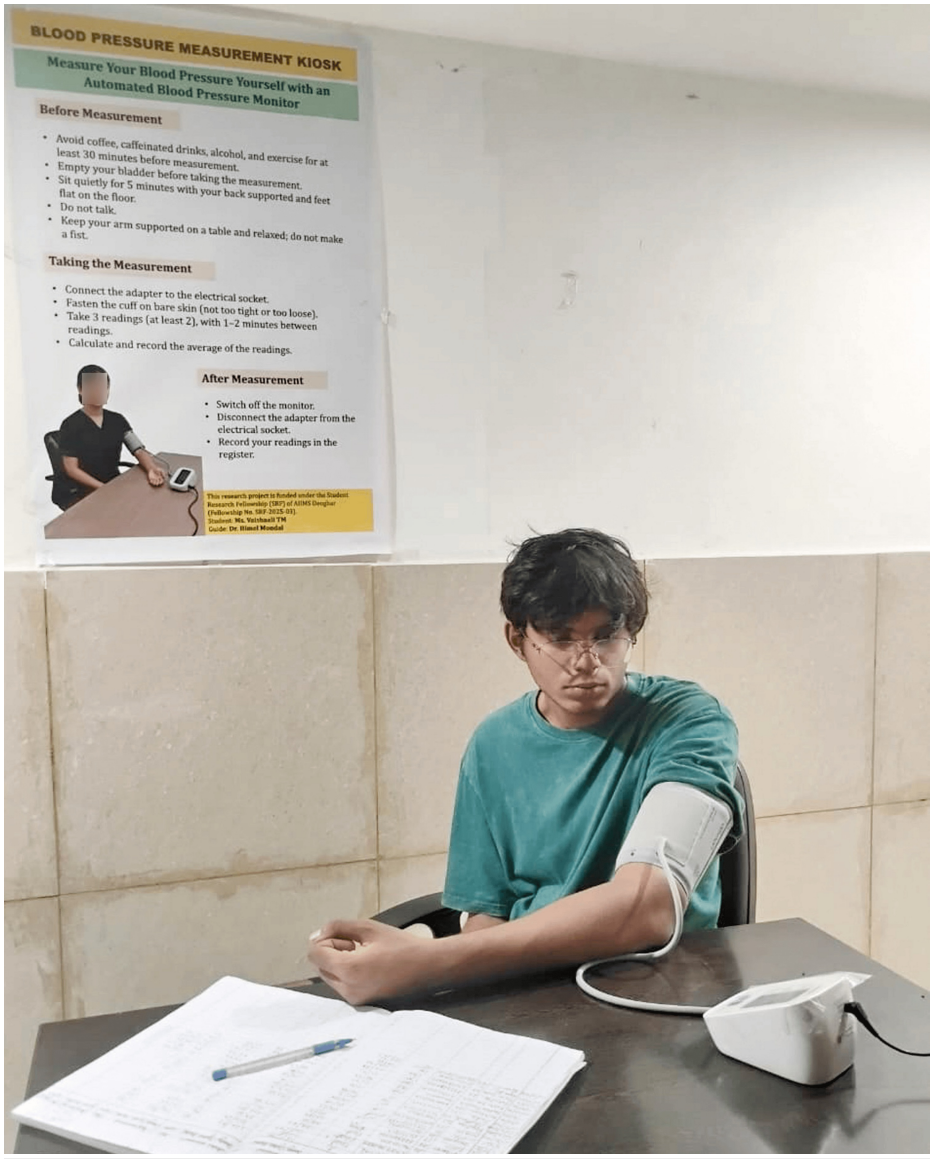


FIGURE 2: A person measuring blood pressure with the BP kiosk with a chair, table, automated BP monitor, register, adapter, and instruction (on wall)

The figure includes a recognizable individual demonstrating the use of the BP monitoring kiosk. Appropriate written informed consent for publication of this identifiable photograph was obtained and documented.

A total of 94 BP measurement sessions were recorded during the study period, comprising 70 (74.47%) in the boys' hostel and 24 (25.53%) in the girls' hostel. Considering the total number of hostel residents, 69 (number of unique measurements) of 241 male residents (28.63%) and 22 (number of unique measurements) of 217 female residents (10.14%) measured their BP. Date-wise numbers of measurements are shown in Figure *3*. The highest utilisation was observed on the first day of installation (24 August 2026), with 44 sessions (46.81% of all recorded sessions). Subsequently, daily utilisation declined substantially, with most days recording fewer than five sessions. The boys' hostel demonstrated higher overall utilization and occasional increases in subsequent measurements, whereas use of the girls' hostel kiosk was intermittent.

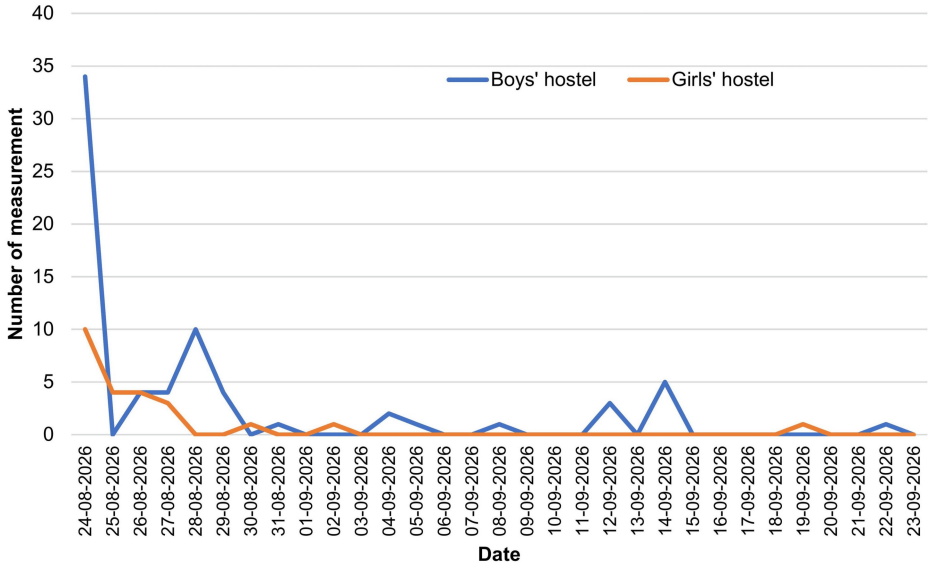


FIGURE 3: Date-wise number of measurements in boys' and girls' hostels

On August 24, 2026, total measurements were 44, and on September 23, 2026, there were no measurements.

Distribution of BP monitoring records and completeness of measurements by hostel is shown in Table 2. First-time measurements accounted for 91 records (96.81% of total measurements), while three records (3.2%) involved repeated measurements. The majority of the students measured BP three times (75 records (79.79% of total measurements)). All 24 (100% of 24 measurements) records from the girls' hostel contained three measurements, compared with 51 (72.86% of 70 measurements) from the boys' hostel.

Parameter	Category	Boys' hostel	Girls' hostel	Total of the two hostels
Measurement type	First measurement	69 (75.82%)	22 (24.18%)	91 (100%)
	Repeated measurement	1 (33.33%)	2 (66.67%)	3 (100%)
Number of measurements completed	Three measurements	51 (68%)	24 (32%)	75 (100%)
	Two measurements	6 (100%)	0 (0%)	6 (100%)
	Single measurement	13 (100%)	0 (0%)	13 (100%)

TABLE 2: Distribution of blood pressure monitoring records and completeness of measurements by hostel

Values are presented as frequency (percentage). For measurement type (first or repeated measurement), percentages are calculated across each row. For the number of measurements completed (three, two, or one), percentages are calculated across each row to show the distribution of records between the two hostels.

Comparison of BP and pulse measurements between the boys' and girls' hostels is presented in Table 3. The mean average systolic BP was significantly higher among students in the boys' hostel than those in the girls' hostel (113.91 ± 10.90 vs. 105.80 ± 10.67 mmHg, respectively; p-value = 0.005). By contrast, the mean average diastolic BP was comparable between the boys' and girls' hostels (71.11 ± 9.22 vs. 69.74 ± 7.69 mmHg, respectively; p-value = 0.54). Similarly, the mean average pulse rate did not differ significantly between the boys' and girls' hostels (78.00 ± 11.29 vs. 80.48 ± 8.47 beats/min, respectively; p-value = 0.36). One-way repeated-measures comparisons across the three successive measurements showed different patterns between the hostels. In the girls' hostel, systolic BP did not differ significantly across measurements, whereas diastolic BP showed a significant difference (p-value = 0.007). In the boys' hostel, significant differences were observed across measurements for both systolic and diastolic BP (p-value = 0.0005 and $p < 0.0001$, respectively). Pulse rate remained comparable across the three measurements in both hostels.

Hostel	Statistics	Systolic 1	Diastolic 1	Pulse 1	Systolic 2	Diastolic 2	Pulse 2	Systolic 3	Diastolic 3	Pulse 3	Average Systolic	Average Diastolic	Average Pulse	Systolic BP		Diastolic BP		Pulse	
														p-value	ANOVA F	p-value	ANOVA F	p-value	ANOVA F
Girls (n = 22)	Mean	106.59	72.23	80.55	106.91	69.05	80.27	103.91	67.95	80.64	105.80	69.74	80.48	0.057	3.17	0.007	6.61	0.94	0.04
	SD	12.41	9.79	9.46	10.63	7.11	8.84	10.61	7.98	9.17	10.67	7.69	8.47						
Boys (n = 50)	Mean	116.20	72.96	78.62	113.34	71.24	77.80	112.18	69.14	77.58	113.91	71.11	78.00	0.0005	9.527	<0.0001	14.77	0.39	0.91
	SD	12.80	9.96	11.91	10.95	10.00	11.80	10.84	8.97	11.59	10.90	9.22	11.29						
Comparison between boys and girls	p-value	0.004	0.77	0.5	0.03	0.36	0.38	0.004	0.6	0.28	0.005	0.54	0.36	-		-		-	
	t-value	2.96	0.29	0.67	2.32	0.93	0.88	3.001	0.53	1.09	2.92	0.61	0.922	-		-		-	

TABLE 3: Comparison of blood pressure and pulse measurements obtained from boys' and girls' hostels

-: not applicable. Only complete sets of three measurements and the first measurement (excluding two repeated in the girls' hostel and one in the boys' hostel) were taken for analysis. Out of 51 sessions with all three readings, one was a repeat session by a returning student; excluding it leaves 50 unique boys. Out of 24 sessions with all three readings, two were repeat sessions by returning students; excluding them leaves 22 unique girls. P-values represent the statistical significance of differences between records in boys' and girls' hostels, assessed using an unpaired t-test for systolic blood pressure, diastolic blood pressure, and pulse rate. Repeated-measures ANOVA p-values indicate differences across the first, second, and third measurements within each hostel group.

Discussion

The successful installation and operation of the BP monitoring kiosks in both hostel settings provide preliminary evidence of the feasibility of implementing self-monitoring facilities in resource-constrained institutional environments. The kiosks were deployed without any reported technical or operational problems. This suggests that such facilities may be introduced without requiring extensive infrastructure or complex operational arrangements. The findings support the potential practicality of decentralized BP monitoring within student residential facilities.

BP measurement can be broadly classified as observer-measured or self-measured. Kiosk-based BP measurement is a form of self-measured BP and may be performed in either an attended or unattended setting. In the present study, unattended kiosk-based BP measurement was used [15]. This kiosk BP has been tested in a community setting [16], retail stores [6], and attached to a clinic [17]. Our study adds to the existing literature by evaluating BP kiosk use in a minimal-resource setting, requiring only a chair (for seating, back support, and foot positioning), a table (to support the forearm and BP monitor), an upper-arm BP monitor, and an instructional banner.

The present study demonstrated an initial peak in the utilization of hostel-based BP monitoring kiosks, followed by a substantial decline over the one-month observation period. Nearly half of all recorded measurement sessions occurred on the first day of installation, suggesting considerable initial interest in the availability of a self-monitoring facility. However, the subsequent reduction in daily utilization indicates that initial curiosity did not necessarily translate into sustained engagement. Previous studies have reported low uptake of BP self-screening kiosks and challenges in completing the recommended measurements, highlighting the need to improve user engagement and sustained utilization [18].

The completeness of BP measurements differed between the two hostels. All 24 records from the girls' hostel contained three measurements, whereas 51 of the 70 records from the boys' hostel included three measurements. Repeated measurements are important because BP can vary with posture, recent activity, emotional state, and other transient influences. Obtaining multiple readings may therefore provide a more representative estimate than relying on a single measurement [11]. However, the present data do not establish why some users completed fewer measurements.

The variation in BP across successive measurements suggests that repeated measurement may influence the recorded BP values. The observed variation in BP across successive measurements supports the importance of recording multiple BP readings rather than relying on a single measurement to obtain a more reliable estimate of an individual's BP [19].

As an auxiliary analysis, the descriptive comparison of average BP showed higher systolic and diastolic values among students using the boys' hostel kiosk than among those using the girls' hostel kiosk. Studies

among Indian young adults have reported sex-related differences in BP, with men generally exhibiting higher systolic BP and a higher prevalence of hypertension than women [20,21]. The average pulse rates were similar between the two groups. These findings describe differences in the recorded measurements but should not be interpreted as evidence of an underlying sex-related difference in BP. The study involved kiosk users rather than a representative sample of all hostel residents, and the groups differed in size and completeness of measurements. The observed differences should therefore be considered exploratory.

Novelty and limitation

This study provides preliminary evidence of the feasibility of implementing hostel-based BP monitoring kiosks to facilitate opportunistic BP monitoring among students. The study's novelty lies in evaluating the implementation and utilization of such facilities in hostel settings; however, the findings should be interpreted in light of several limitations. The study was conducted over one month in two hostels at a single institution, limiting generalization. Participation was entirely voluntary, creating substantial self-selection bias as students who utilized the kiosks may have possessed greater baseline health awareness, motivation, or cardiovascular risk concerns than nonparticipants. Consequently, the observed utilization patterns and hemodynamic measurements cannot be considered representative of the broader hostel population. Additionally, while paper registers provided a low-cost, minimal-infrastructure solution, logging identifying information (names and mobile numbers) in an open register within a hostel space presents inherent confidentiality limitations, as completed entries were visible to subsequent users. Although stationed under security supervision and fully de-identified prior to analysis, future implementations should incorporate privacy-preserving mechanisms, such as privacy drop-boxes/slips, shielded kiosks, or automated digital kiosks that transmit encrypted readings directly to a secure server without exposing prior entries to subsequent peers. Furthermore, formal quantitative feasibility benchmarks or systematically logged downtime indicators were not defined prospectively. Although alternate-day checks confirmed continuous device function and uninterrupted log availability, our findings reflect short-term operational practicality and initial uptake rather than comprehensive feasibility, cost-effectiveness, or long-term sustainability. Users' experiences, reasons for non-use, and factors influencing measurement completion were not assessed and are planned to be assessed in a future study. Future studies should incorporate longer observation periods, individual-level follow-up, user feedback, and systematic assessment of resource requirements to establish the effectiveness, acceptability, and sustainability of hostel-based BP monitoring as a student health promotion strategy.

Conclusions

The installation and operation of BP monitoring kiosks in boys' and girls' hostels demonstrated the short-term operational practicality of providing decentralized BP monitoring within student residential facilities. Although initial utilization was encouraging, a substantial decline in use was observed over the subsequent study period, alongside notable differences in measurement completeness between settings. Larger, multi-centre studies with longer follow-up, individual-level utilization data, and formal assessments of usability, cost, and sustainability are warranted to determine the broader applicability of hostel-based BP monitoring kiosks as a student health promotion strategy.

Additional Information

Author Contributions

All authors have reviewed the final version to be published and agreed to be accountable for all aspects of the work.

Acquisition, analysis, or interpretation of data: Anupkumar D. Dhanvijay, Vaishaali TM, Himel Mondal, Ayesha Juhi

Critical review of the manuscript for important intellectual content: Anupkumar D. Dhanvijay, Vaishaali TM, Himel Mondal, Ayesha Juhi

Concept and design: Vaishaali TM, Himel Mondal

Drafting of the manuscript: Himel Mondal

Supervision: Himel Mondal

Disclosures

Human subjects: Informed consent for treatment and open access publication was obtained or waived by all participants in this study. Institutional Ethics Committee of All India Institute of Medical Sciences, Deoghar issued approval 2026-SRF-03-06. **Animal subjects:** All authors have confirmed that this study did not involve animal subjects or tissue. **Conflicts of interest:** In compliance with the ICMJE uniform disclosure form, all authors declare the following: **Payment/services info:** This research project is funded under the

Student Research Fellowship (SRF) of AIIMS Deoghar (Fellowship No. SRF-2026-03), where Vaishaali TM is the student, Dr. Himel Mondal is the guide, and Dr. Ayesha Juhi is the co-guide. The student (Vaishaali TM) received an amount of ₱10,000 as a fellowship amount and utilized the funds partially to purchase two blood pressure monitors from an e-commerce website. She would get an additional fund of ₱5,000 as an incentive for publication of the research findings. **Financial relationships:** All authors have declared that they have no financial relationships at present or within the previous three years with any organizations that might have an interest in the submitted work. **Associate Editor authorship:** Anupkumar D. Dhanvijay was an Associate Editor for the Cureus Journal of Medical Science at the time of submission. To minimize potential bias, this manuscript was handled independently by an alternate Associate Editor with no conflict of interest, and the author was blinded to and had no access to the peer review process, reviewer identities, or editorial decision-making for this submission. **Other relationships:** All authors have declared that there are no other relationships or activities that could appear to have influenced the submitted work.

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