


# Phone calls for improving blood pressure control among hypertensive patients attending private medical practitioners in India: Findings from Mumbai hypertension project

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## Abstract

Despite the availability of effective medication, blood pressure control rates are low, particularly in low- and middle-income countries. Adherence to medication and follow-up visits are important factors in blood pressure control. This study assessed the effectiveness of reminder telephone calls on follow-up visits and blood pressure control among hypertensive patients as part of the Mumbai Hypertension Project. This project was initiated by PATH with the support from Resolve to Save Lives from January 2019 to February 2020. The study included hypertensive patients attending 164 private practices in Mumbai, India; practitioners screened all adults visiting their clinic during the project period. Among 13 184 hypertensive patients registered, the mean age was 53 years (SD = 12.38) and 52% were female. Among the 11 544 patients that provided phone numbers and gave consent for follow-up calls, 9528 responded to phone calls at least once and 5250 patients followed up at least once. Of the 5250 patients, 82% visited the clinic for follow-up visit within one month after receiving the phone call. The blood pressure control rate among those who answered phone calls and who did not answer phone calls increased from 23.6% to 48.8% ( $P < .001$ ) and 21.0% to 44.3% ( $P < .001$ ), respectively. The blood pressure control rate at follow-up was significantly associated with phone calls (OR: 1.51, 95% CI: 1.34 - 1.71). The study demonstrates that telephone call intervention and follow-up visits can improve patient retention in care and, subsequently, blood pressure control among hypertensive patients attending urban private sector clinics in India.

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## 1 | INTRODUCTION

Hypertension is a major risk factor for cardiovascular disease (CVD) morbidity and mortality.<sup>1</sup> It affects over one billion adults worldwide and is predicted to affect over 1.5 billion adults by 2025.<sup>2</sup> CVD is now the number one cause of death, accounting for 28.1% of deaths and 14.1% of life-years lost in India.<sup>3</sup> Hypertension is one of the primary risk factors for CVD in India, with 54.6% of CVD disability-adjusted life-years attributable to high systolic blood pressure.<sup>3</sup> Hypertension can be controlled by daily intake of antihypertensive medicine and by adopting a healthy lifestyle.<sup>4</sup> Adherence to medication therapy is a primary determinant for hypertension control.<sup>5</sup> In India, studies have estimated the rates of non-adherence to medication among person with hypertension to be between 27% and 70%.<sup>6</sup> Along with other factors, non-adherence has yielded poor blood pressure control in India. A nationally representative study among persons with hypertension age 15-49 years found that only 13% were on treatment, and 8% had their hypertension under control.<sup>7</sup> The prevalence of hypertension in the state of Maharashtra was 25.1% for those above 18 years of age, 23.9% in rural and 26.7% in urban areas.<sup>8</sup>

A representative study of older individuals in India found that those with diabetes or hypertension were more likely to use private care than other adults.<sup>9</sup> Thus, focusing on the government health care delivery system alone would not be enough to increase blood pressure control. There is also a need to implement feasible and effective methods to support the patient's return to clinics for follow-up and adjustment of antihypertensive treatment.

Clinical trials have demonstrated the efficacy of several strategies for improving adherence and lowering blood pressure.<sup>10</sup> A systematic review found evidence that several mHealth interventions such as short text messages (SMS), phone calls, and mobile applications for self-management improve adherence to medication as well as control of hypertension.<sup>11</sup> While the use of telephone calls as a reminder may help for follow-up and counseling on hypertension therapy,<sup>12</sup> this approach has not been systematically evaluated in India, although India has approximately 1.18 billion wireless subscribers.<sup>13</sup>

Given the hypertension burden in Mumbai, Resolve to Save Lives (RTSL) and PATH designed the Mumbai Hypertension Project to improve hypertension management in the urban slums of Mumbai. The Municipal Corporation of Greater Mumbai (MCGM), the target project area, is an urban agglomerate with approximately 12.3 million people, of which nearly 50% live in slums. Mumbai Hypertension Project aims to generate evidence for the government, RTSL, and other stakeholders to inform a targeted approach for effectively engaging the private sector. This study also intends to demonstrate a replicable service delivery model that could ensure that both private providers and people living with hypertension receive the requisite support to ensure treatment continuity and follow-up monitoring, based on a standardized approach for hypertension management. As part of the larger study, this study evaluates the effect of telephone

calls on follow-up visits and blood pressure control among hypertensive patients registered in two wards of Mumbai from January 2019 to December 2019.

## 2 | METHODS

### 2.1 | Study setting, design, and participants

This study was conducted in 164 private practitioner clinics catering to the urban slum population in two wards of Mumbai. Both wards were part of a private sector-focused interventions: the N ward (a sporadic slum cluster) received an "intensive" intervention and the G-North ward (a dense slum cluster) received a "lean" intervention. The private sector clinics in the intensive intervention ward were assigned to receive project support staff, monthly phone calls, and free medicines, whereas clinics in the lean intervention ward received quarterly phone calls and free medicines.

The intervention wards have an estimated combined population of 1.2 million,<sup>14</sup> including 450 000 adults, and an estimated hypertension burden of 130 700 adults.

Mapping of the available private clinics in the selected urban slums was conducted through a survey of 420 medical practitioners in the identified geography. Two hundred providers were approached and 164 were engaged in a phased manner. The engagement criteria adopted for the selection were as follows: (a) interest in participating in the study, 2) Outpatient Department (OPD) patient load  $\geq 50$  adults per day, and 3) comfort with prescribing project-selected preferred antihypertensive brands. Among these providers, 32% had Doctor of Medicine (MD), 17% had Bachelor of Medicine and Bachelor of Surgery (MBBS), and 63% had Ayurveda, Yoga and Naturopathy, Unani, Siddha, and Homeopathy (AYUSH) academic qualifications. During the study period, a total of 13 184 patients were enrolled in the study.

Patients above 18 years of age accessing services from the participating clinics of registered private medical practitioners were screened for hypertension, per the Maharashtra hypertension protocol (Figure 1).<sup>15</sup> Professional, validated digital blood pressure devices were provided to the practitioners for hypertension screening. Per the protocol, Stage I hypertensive patients (BP = 140-159/90-99 mm Hg) required at least two blood pressure measurements on two different days to diagnose the patient as hypertensive. Whereas Stage II hypertensive patients (BP  $\geq 160/100$  mm Hg) required at least two readings on the same day to confirm the diagnosis. The second reading was considered as diagnostic. Accordingly, patients diagnosed with hypertension, as well as existing hypertensive patients on treatment, were registered in this study after providing informed consent.

The patients registered under the Mumbai Hypertension Project in both the lean and intensive wards (Figure 2) were expected to follow-up every month for blood pressure measurement and prescription refill. Once the telephone call intervention

**Maharashtra**

# Hypertension Protocol

Measure blood pressure of **all adults over 18 years**

High BP: SBP  $\geq$  140 or DBP  $\geq$  90 mmHg

Check for compliance at each visit before titration of dose or addition of drugs

**Step 1** If BP is high\*

**Prescribe Amlodipine 5 mg + adherence counseling**

**Step 2** After 30 days measure BP again. If still high:

**Add Telmisartan\*\* 40mg**

**Step 3** After 30 days measure BP again. If still high:

**Increase Telmisartan to 80mg**

**Step 4** After 30 days measure BP again. If still high:

**Increase Amlodipine to 10mg**

**Step 5** After 30 days measure BP again. If still high:

**Add Chlorthalidone 6.25mg**

**Step 6** After 30 days measure BP again. If still high:

**Increase Chlorthalidone to 12.5mg**

After 30 days measure BP again. If still high:

Check that patient has been taking drugs regularly and correctly. If so, refer patient to a specialist.

**Women who are or could become pregnant**

▲ DO NOT give Telmisartan or Chlorthalidone.

- ACE inhibitors, angiotensin receptor blockers (ARBs), thiazide/thiazide like diuretics and statins should not be given to pregnant women or to women of childbearing age not on highly effective contraception.
- Calcium channel blocker (CCB) can be used. If not controlled with intensification dose, refer to specialist.

**Diabetic patients**

- Treat diabetes according to protocol.
- Aim for BP target of <140/90.

**Heart attack in last 3 years**

- Add beta blocker to Amlodipine at initial treatment.

**Heart attack or stroke ever**

- Begin low-dose aspirin (75 mg) and statin.

**Chronic kidney disease**

- ACE inhibitor or ARB preferred if close clinical and biochemical monitoring possible after specialist opinion.

\* If SBP 140-159 and/or DBP 90-99, start on lifestyle management for one month prior to initiation of medications.

† If SBP  $>$ 180 and/or DBP  $>$ 110 start treatment and refer to specialist immediately.

**Recommended investigations at initiation of therapy:** CBC, blood sugar, serum creatinine, electrolytes (optional). If S creatinine  $>$ 1.5 mg, refer to specialist.

\*\* If Telmisartan not available: replace with Enalapril 5 mg (initiation dose) and 10 mg (intensification dose).

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**Lifestyle advice for all patients**

Eat less than 1 tsp of salt per day; avoid papads, chips, chutneys, dips, pickles, etc.

If overweight, lose weight.

• Limit intake of fried foods.

Exercise regularly: 2.5 hours per week

Avoid alcohol and tobacco

• Avoid foods with high amounts of saturated fats (e.g. cheese, ice cream, fatty meat).

Eat 5 servings of fruits and vegetables per day.

• Avoid processed foods containing trans fats.

• Use healthy oils: polyunsaturated and monounsaturated oils.

• Avoid added sugar.

• Reduce fat intake by changing how you cook: remove the fatty part of meat; use vegetable oil, boil, steam or bake rather than fry; limit reuse of oil for frying.

India Hypertension Management Initiative: Maharashtra 1.0(0-16)

FIGURE 1 Maharashtra Hypertension Protocol [Color figure can be viewed at [wileyonlinelibrary.com](http://wileyonlinelibrary.com)]

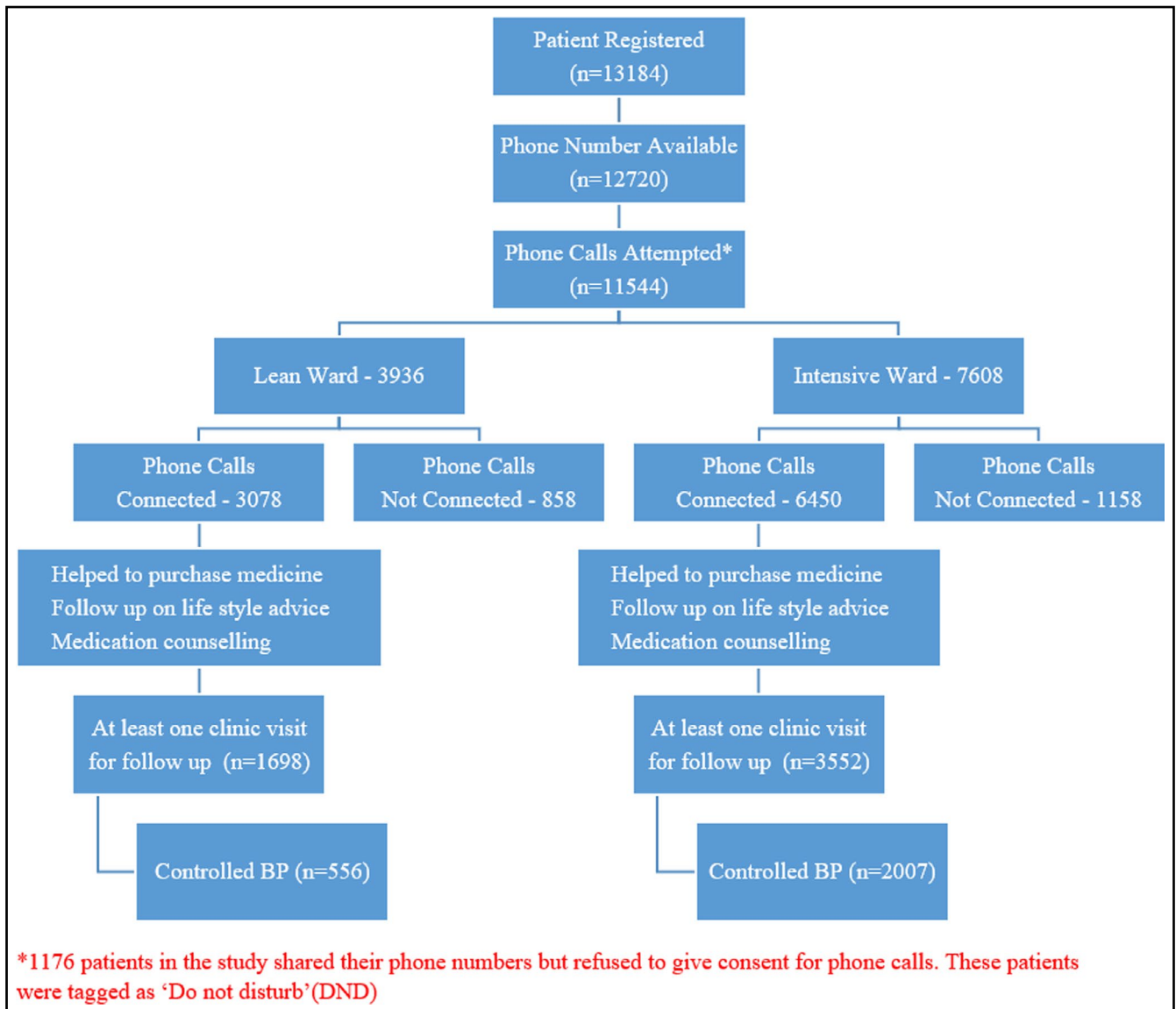
commenced, patients overdue for their regular monthly follow-up visits received a phone call from a trained treatment coordinator. During this telephone conversation, the treatment coordinator inquired about treatment adherence, educated the patient about lifestyle management and the complications of uncontrolled blood pressure, and encouraged them to visit the practitioner for regular blood pressure measurement. To ensure the quality of calls, random on-spot checks were done with the help of a supervisory checklist (Table 1). Scoring was done for the purpose of setting goals and tracking improvement. Supervisors immediately shared the evaluation results with the treatment coordinators.

Information regarding patient's age, sex, unique project ID number, phone number, blood pressure measurement, medication prescribed, consent, new registration/follow-up visits were recorded

in triplicate vouchers maintained in the project. The data related to these variables were maintained in an excel sheet.

## 2.2 | Data analysis

The blood pressure measurement recorded during registration was considered as the baseline, and the blood pressure recorded during the most recent follow-up visit was considered as the end point. Phone call group is defined as those who answered at least one phone call, and no phone call group is defined as those who did not answer any phone call. All analyses were performed using R software.<sup>16</sup> The categorical variables are provided as percentages, and the continuous variables are summarized as means  $\pm$  SD. Chi-square test and t-test for independent samples were performed for



**FIGURE 2** Flow Diagram of Study Participants. \*1176 patients in the study shared their phone numbers but refused to give consent for phone calls. These patients were tagged as "Do not disturb" (DND) [Color figure can be viewed at wileyonlinelibrary.com]

categorical and continuous variables, respectively. Multiple logistic regression models were used to explore the association between phone calls and blood pressure control, adjusting for age, ward type, sex, and baseline blood pressure control rate. A two-sided  $P$ -value  $< 0.05$  is considered statistically significant.

### 3 | RESULTS

The baseline characteristics of the participants are presented in Table 1. Among 13 184 hypertensive patients registered from January 2019 to February 2020, the mean age was 53 years (SD = 12.38), 52% were female, and 96% provided their phone number. The largest number of patients were enrolled in November

2019, followed by October 2019. The cumulative number of patients registered by month is presented in Figure 3.

Of 13 184 registered patients, phone numbers were available for 12 720. Among them, phone calls were attempted for 11 544. Of the 11 544 patients, 9528 answered to at least one phone call, and 5250 patients came for at least one follow-up visit at the practitioner's clinic. Among the 2016 patients whose phone did not answer, 889 came for at least one follow-up visit.

The mean systolic and diastolic blood pressure during baseline were 155.5/93.8 (SD = 19.9/11.5) and 154.3/91.8 (SD = 20.3/12.0) mm Hg in the phone call and no phone calls group, respectively in the lean ward and 147.5/88.3 (SD = 22.9/13.4) and 149.8/89.4 (SD = 21.2/13.5) mm Hg in the phone and no phone calls group, respectively in the intensive ward. The patient follow-up characteristics

TABLE 1 Supervisory checklist for coordinators making phone calls

Coordinator name: Name of Supervisor:		
No.	Indicator	Score
1	Weekly Due List with details available in hand before the call	Y N
2	Patient greeted and self-introduction that call is made on behalf of the doctor	Y N
3	Briefed the patient on the purpose of call (adherence/follow-up) & asked language preference of the patient	Y N
4	Asked the patient if its right time to talk & can s/he spare 10 mins (adherence) or 5 mins (follow-up)	Y N
5	Reconfirm patients address / locality	Y N
6	Whether following points covered in the conversation	
	Background information on Hypertension—Family History etc	Y N
	Latest BP measurement done & explain Normal Blood Pressure	Y N
	Whether Patient ID card was handed over after registration.	Y N
7	Emphasize on harmful effects of uncontrolled blood pressure—physiological & financial	Y N
8	Importance of Medication Adherence (more emphasis during adherence call)	Y N
9	Advice patient to follow-up with doctor if any side effects or discomfort	Y N
10	Advice on Lifestyle Changes (must during adherence call / during follow-up only for uncontrolled BP patients)	Y N
	Exercise for at least 30 minutes a day- yoga or walk	Y N
	Salt reduction: Not more than 1 teaspoon (<5mg) for the whole day including all meals	Y N
	If alcohol drinking or smoking is a part of daily lifestyle, it is best to stop or progressively reduce the behavior	Y N
11	Remind the patient to return to follow-up on the date mentioned in the prescription/ID card given by doctor.	Y N
12	In Intensive ward, the alternate places for BP check-up—provide the option for free F/U check-up—hub / community kiosk	Y N NA
13	Emphasize the importance of regular follow-up	Y N
14	Remind patient to carry along the patient ID card during each visit	Y N
15	Thank the patient for their valuable time	Y N
	Total Score (Out of 20)	

are presented in Table 1. 55% of patients from the answered phone call group and 44% of patients from the unanswered phone call group attended at least one follow-up visit in the clinic. The mean SBP and DBP among the phone call group in the lean ward were 142.3 (SD = 17.4) mm Hg and 86.7 (SD = 10.5) mm Hg, whereas in the intensive ward were 135.8 (SD = 18.1) mm Hg and 82.8 (SD = 11.1) mm Hg. The mean SBP and DBP among no phone call group in the lean ward were 145.3 (SD = 18.0) mm Hg and 87.4 (SD = 10.7) mm Hg, respectively, and in the intensive ward were 135.8 (SD = 17.8) mm Hg and 83.0 (SD = 10.2) mm Hg, respectively. Of the 5250 patients who answered the phone call and returned for a follow-up visit, 82% patients (Table 3) visited the clinic within one month after receiving the phone call; whereas, of the 889 patients for whom the phone did not connect but followed up, 38% patients visited for the same time.

The proportion of patients with controlled blood pressure increased from 23.6% to 48.8% ( $P < .001$ ) in the call answered group and 21.0% to 44.3% ( $P < .001$ ) in the call not answered group. The association between blood pressure control status at the follow-up visit and phone calls are presented in Table 4. The odds of hypertension control were 1.52 (OR: 1.52, 95% CI: 1.35-1.72) times higher among those who answered the phone call than those who did not. We found that the odds of hypertension control were 1.88

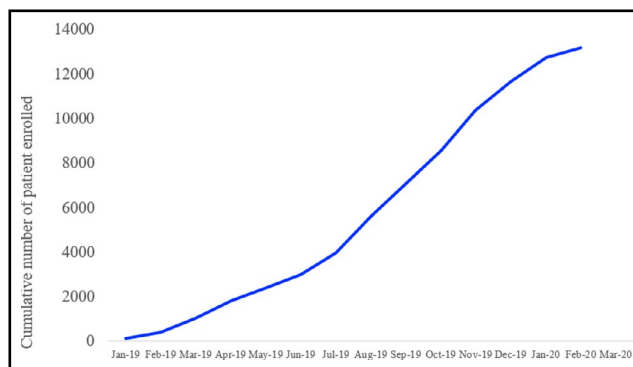


FIGURE 3 Cumulative number of patients enrolled in the hypertension control program; Patients were recruited based on hypertension diagnosis made in private sector clinics in two wards of Mumbai, India [Color figure can be viewed at wileyonlinelibrary.com]

(OR = 1.88; 95% CI: 1.70-2.08) times higher in intensive ward compared to lean ward. We also found that being female was significantly associated with blood pressure control compared to being male (OR: 1.32; 95%CI: 1.21-1.44).



TABLE 2 Baseline and Follow-up characteristics of the patients

Variables	Baseline				Follow-up			
	Phone Call connected (n = 9528)		Phone Calls not connected (n = 2016)		Phone Call connected (n = 5250)		Phone Calls not connected (n = 889)	
	Lean (n = 3078)	Intensive (n = 6450)	Lean (n = 858)	Intensive (n = 1158)	Lean (n = 1698)	Intensive (n = 3552)	Lean (n = 324)	Intensive (n = 565)
Mean Age (SD)	50.4 (12.8)	53.8 (12.0)	51.7 (12.9)	55.2 (12.1)	51.1 (12.3)	53.7 (11.8)	52.3 (11.8)	54.8 (11.5)
Male (%)	1606 (52.2%)	3064 (47.5%)	416 (48.5%)	443 (38.2%)	873 (51.4%)	1695 (47.7%)	149 (46.0%)	197 (34.9%)
Mean SBP (SD)	155.5 (19.9)	147.5 (22.9)	154.3 (20.3)	149.8 (21.2)	142.3 (17.4)	135.8 (18.1)	145.3 (18.0)	135.8 (17.8)
Mean DBP (SD)	93.8 (11.5)	88.3 (13.4)	91.8 (12.0)	89.4 (13.5)	86.7 (10.5)	82.8 (11.1)	87.4 (10.7)	83.0 (10.2)
Controlled BP no. (%)	359 (11.7%)	1897 (29.4%)	147 (17.1%)	276 (23.8%)	556 (32.7%)	2007 (56.5%)	96 (29.6%)	298 (52.7%)

TABLE 3 Number of days taken for follow-up visit among the patients for whom follow-up call was connected in MHP

No. of days to follow-up visit <sup>a</sup>	Patients who answered phone call N = 5250		Patients who did not answer phone call N = 889	
	Total	Cumulative %	Total	Cumulative %
Less than 0	261	5%	0	0%
<=7 D	2370	50%	70	8%
8-15 D	474	59%	54	14%
16-30 D	1182	82%	210	38%
>=31 Days	963	100%	555	100%

<sup>a</sup>Patients who did not come within 30 days after receiving phone calls were given reminder calls every month. Also, patients registered in last month (December 2019) of the study were allowed to visit till Feb 2020.

TABLE 4 Logistic regression analysis of blood pressure control status at baseline/follow-up visit and phone calls

Variable	OR	95% CI
Connected to phone calls		
No	Ref	
Yes	1.52	1.35 - 1.72
Sex		
Male	Ref	
Female	1.322	1.21 -1.44
Age		
18-44 y	Ref	
45 to 59 y	1.22	1.08 - 1.39
≥ 60 (reference: 18-44 y)	1.11	0.97 - 1.28
Ward		
Lean	Ref	
Intensive	1.88	1.70-2.08

Note: Patients whose phone calls were connected after completion of at least 30 days after registration were included in this analysis. Adjusted for age, sex, ward, and hypertension control status at baseline visit.

## 4 | DISCUSSION

This study demonstrates that telephone calls can be an important intervention for motivating hypertension patients to attend regular follow-up visits in India's private sector, yielding improved retention in care and improved blood pressure control in patients participating in the intervention.

Our results are similar to the study conducted in Tamil Nadu, India in a government tertiary care hospital, where counseling through telephone calls provided by pharmacists improved medication adherence and treatment satisfaction.<sup>17</sup> According to Krishna et al, telephone reminder calls encouraged patients to attend scheduled, or remedy missed, follow-up visits with private practitioners in Madhya Pradesh, which is similar to our findings.<sup>18</sup> A study on diabetes management found a telephone support line at the hospital and community level to be a useful tool for improving follow-up and management in diabetes.<sup>19</sup>

The blood pressure control rate among phone call group increased from 25.0% to 48.8% in just 12 months. The difference in the control rate between those who answered the phone calls and those who did not was 4.5%. However, this difference should be interpreted cautiously because these two groups were not randomized. The characteristics of those who answered and not answered the phone might be different. Phone numbers that did not result in connection because of a wrong number/switched off/unavailable showed the importance of validating mobile numbers at the time of registration to ensure accurate phone numbers are recorded in the database. Even when calls were connected, 2% of the phone calls were answered by patient relatives not expecting these phone calls. Those who returned to the clinic without a reminder might be more serious about their treatment plan, and we could expect that most of those who did not return to the clinic might be asymptomatic. As patients included in the analysis had at least two visits to the clinics, this might have contributed to the significant increase in control rate regardless of the phone call. The comparison group used in this

study may not reflect the actual blood pressure control rate of those who never returned to the clinic. Future studies are needed to explore the reasons why patients did not return to the clinic and what factors motivate them to return to the clinic.

The results of this analysis should be interpreted with caution because they were observed in the context of an ongoing multi-component hypertension control program, and the intervention and subsequent data analysis were conducted across lean and intensive wards. Another limitation of the study is that we did not have complete information about the registered patients' history and type of medication. These two factors affect the control rate of hypertension. Further, other project strategies like no-cost medication, provider consultation charges, project support staff placed at high load clinics, patient socio-economic status, and patients' underlying conditions could have influenced the follow-up and control rates. Nevertheless, the study showed that telephone calls made to hypertensive patients that focused on the importance of regular follow-up, lifestyle changes, and medication adherence seemed to improve the blood pressure control rate among those who returned to the follow-up visits.

## 5 | CONCLUSION

This study demonstrates that participation in a telephone call intervention can improve patient retention in care and, subsequently, blood pressure control among hypertensive patients attending urban private sector clinics in India. Based on the results, the Municipal Corporation of Greater Mumbai and the state government of Maharashtra may explore utilizing the existing government call center to follow-up with hypertensive patients. Also, in the current pandemic situation, our approach could be an alternative strategy for the management of non-communicable diseases like hypertension, diabetes, etc to ensure compliance with treatment and to provide patient education on the importance of lifestyle modifications. To optimize private sector involvement in hypertension management, the call center approach is necessary in the current and post-COVID-19 era.

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## CONFLICT OF INTEREST

None.

## AUTHOR CONTRIBUTIONS

MK was responsible for the conception and study design, drafting, and revising the manuscript. RG, SS, and SG were responsible for data collection and field implementation. HP, VW, and AP were responsible for data analysis and interpretation of the results. AKP, SV, NJ, HM, RG, DN, AS, and BS were involved in intellectual input and critical manuscript revision. AH and VJ were responsible for data review and interpretation of the results and supported drafting and revising manuscript. All authors approved the final version of the manuscript submitted.

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