Improving Hypertension Control via a Team-based Educational and Refill Monitoring (TERM) Intervention, Sharjah, United Arab Emirates

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Abstract

Background: There are insufficient blood pressure control rates even in high-performing health systems, and effective management of hypertension remains a challenge in a real-life general practice. This is because of many factors including unhealthy life style, improper prescribing and poor medication adherence. Cost effective and innovative interventions to improve BP control are therefore needed.

Aim: We aimed to study the impact of a 6-month Team- based Educational and Refill Monitoring (TERM) intervention in improving BP control among UAE adult citizens diagnosed with hypertension.

Methods: This is a clinical trial, where, 214 hypertensive UAE citizens ≥18 years participated in a 6 months TERM intervention compared with 214 hypertensive UAE citizens receiving usual care, Primary Health Care Department, Sharjah Medical District (SMD), United Arab Emirates (UAE). Before the intervention, all physicians, pharmacists and nurses of the TERM group were enrolled in a one week medical education three sessions. These sessions provided information in two domains: practice guidelines based on guidelines of the Joint National Committee (JNC 7) (13) and principles of health education and communication. As well, a monthly health education session, telephone calls and SMS messages have been used to intensify medication adherence and hypertension self-management of TERM patients. The primary outcomes were changes in systolic blood pressure (SBP), diastolic blood pressure (DBP), medication refill adherence (MRA) and blood pressure (BP) control.

Results: Participants had a mean age of 57.4± 11 years (TERM) and 57.5± 11.1 years (control). 57.1% were males (TERM) and 57.9% were females (control). At baseline there was no significant difference between both groups in regard to occupation, education, smoking, blood lipids, body mass index (BMI), SBP, DBP and MRA. Meanwhile, at baseline, only 35% of TERM patients compared to 34.9% of usual care patients had controlled blood pressure (defined as BP< 140/90 mmHg). At 6 months, TERM participants achieved greater improvements compared to usual care group in regard to SBP (139.3 ± 14.2 mmHg vs. 152± 13.4 mm Hg, P<0.001), DBP (85.3± 9.3 vs. 92.4± 6.8 mm Hg, P<0.001), BP control (50% vs. 36%, P = 0.01) and medication refill adherence (92% vs.86%, P<0.001).

Conclusion: A team-based educational intervention for both staff and patients led to significant improvement in SBP, DBP, MRA and BP control in adult hypertensive patients, primary health care setting, Sharjah Medical District, UAE.

Key words: Blood pressure control, health education, medication adherence, team-based care

Background

Hypertension is the single most important modifiable risk factor for the development of cardiovascular diseases, accounting for 13% of mortality worldwide (54% for stroke and 47% for ischemic heart disease). (1,3,4) A systematic review reporting data from studies in 35 different countries between the years 2003 and 2008 demonstrated an overall hypertension prevalence of 37.8% for men and 32.1% for women.(2)

It is striking that blood pressure goals continue to be achieved in only 25–40% of the patients who take antihypertensive drug treatment, a statistic that has remained unchanged for the past 40 years.(3,10,11) Fortunately, adequate blood pressure (BP) control can reduce mortality and produce significant cardiovascular benefits in all patients.(4,5,21) However, translation into clinical practice of advances in management of HTN is suboptimal, largely because of barriers that exist at the levels of the patient, the health care provider, and the health care system. One of the main existing barriers to optimal BP control is poor adherence to timely medication refill and other issues contributing to lack of provider intensification of this adherence.(6,21)

Because hypertension is almost entirely managed by the primary care team, primary health care tools like health education can create opportunities for patients to better understand their conditions and the role of therapies, as well as, to heighten awareness about disease progression and complications. Educational intervention can also positively modify patients' beliefs and misconceptions, which in turn can lead to a change in patient's behavior, such as improvement in medication adherence and healthy lifestyle, therefore, potentially leading to improved blood pressure control and the related complications.(7-20)

A Cochrane review of 72 randomized controlled trials compared various interventions for controlling blood pressure and concluded that a complex intervention aiming at improving patient recall systems to intensify medication refill, education of doctors to improve medication prescribing skills and patients education to improve healthy life styles and self-management, were the best strategies to improve hypertension control.(7)

Owing to the high morbidity and mortality caused by hypertension, and the global scale of this important public health issue, we found an urgent need to continue to investigate suitable interventions that can improve blood pressure control in a community like primary health care, where many opportunities for improvement are available mainly with the provision of free health care. Our study tests the impact of a team based educational and medication intensification intervention in improving blood pressure control.

Methods

This is a controlled clinical trial where 214 known hypertensive UAE citizens, registered in Sharjah Family Health Center , Sharjah Medical District, UAE, participated in a 6 months (January 2013 to June 2013) culturally tailored team-based educational intervention.

This intervention group was compared with 214 hypertensive citizens receiving usual care in another urban family health center of the same district (Riqa FHC). Before the intervention, all physicians, pharmacists and nurses of the TERM group were enrolled in a one week medical education three sessions. These sessions provided information in two domains: core hypertension knowledge and practice guidelines based on guidelines of the Joint National Committee (JNC 7) (13) and principles of health education and communication.

These sessions were conducted by a consultant family doctor who was also working among TERM researchers. As well, TERM patients attended doctor-led once-weekly 2 –hour educational sessions for one month including: definitions of high BP, symptoms and complications of HTN, BP home monitoring, BP control goals, follow up intervals, MRA as well as nutritional and exercise advice.

Intensification of medications adherence was done through scheduled appointments, SMS messages and phone calls to remind patients of refill due dates. The patient was considered unreachable after 3 unsuccessful phone calls, one of them at the same refill due date. Non adherence to medication refill was considered immediately after the due date. Nurses were responsible for sending SMS, while pharmacists were responsible for scheduling refill appointments and phone calls. All TERM members were involved in continuous patient education and assessment of medication adherence when the patients attended the PHC center monthly to refill their medications (as per local drug dispensing regulations). At base line, both groups were compared regarding sociodemographic characteristics (age, sex, marital status, occupation, and education), smoking status, resting BP, BMI, and ECG to diagnose left ventricular hypertrophy and blood samples were collected after a 10-12-hour fasting for assessment of glycated haemoglobin (HbA1c), serum lipid profile (SLP) and kidney function tests (KFT). Patients under dialysis or who had mental disability were excluded from the study. Office BP was measured by trained nurses using an automated BP monitor with the patient seated comfortably for 5 minutes before each measurement, following JNC7 guidelines(13). Blood pressure was defined as uncontrolled if SBP ≥140 mm Hg or DBP ≥90 mmHg. Height and weight were measured without shoes and measurements were recorded to the nearest 1 cm and 0.1 kg respectively. These data were used to compute body mass index. All the above tests and measures were obtained at baseline and after 6 months in both intervention and control groups. Meanwhile comparison was done within the same group to compare any change between baseline and end of the study results. Ethical approval was obtained from the Ethics Commission of the Sharjah Medical District (reference number: 13-5537-BO, date of approval: 7 September 2012) and verbal informed consent was taken from all TERM patients.

Results

Statistical analysis:
Data were analyzed using Statistical Program for Social Science (SPSS) version 18.0. Quantitative data were expressed as mean± standard deviation (SD). Qualitative data were expressed as frequency and percentage. Independent-samples t-test of significance was used when comparing between two means, paired sample t-test of significance was used when comparing between related samples and P-value <0.05 was considered significant.

Base Line Characteristics

Table 1: Comparison between intervention and control groups as regards baseline characteristics.

		Intervention (n=214)		control (n=214)		χ^2	P value
		n	%	n	%		
Gender	Male	92	42.9	91	42.1	3.8	0.382
	Female	122	57.1	123	57.9		
Educational level	No Education	56	26.1	55	25.7	5.7	0.231
	Read and write	9	4.2	10	4.7		
	Primary	11	5.1	13	6.1		
	Secondary	72	33.6	71	33.1		
	university	66	30.8	65	30.4		
Smoking	Smokers	44	20.6	46	21.5	6.4	0.193
	Non-smokers	170	79.4	168	78.5		
BP control	Controlled	75	35	74	34.9	7.1	0.187
	Uncontrolled	139	65	140	65.1		
MRA	Adherent	86	40.2	84	39.3	2.6	0.481
	Non-adherent	128	59.8	130	60.7		
			Mean ± SD	intervention (n=214)	control (n=214)	t	P value
Age				57.36±10.97	57.55±11.11	3.1	0.113
BMI				29.02±6.2	29.25±6.3	1.9	0.197
SBP				152.36±12.93	151.34±14.74	1.1	0.274
DBP				91.61±6.92	90.43±7.97	1.9	0.061
A1C				7.2±0.87	7.1±0.95	1.4	0.171

BMI= body mass index, SBP= systolic blood pressure, DBP= diastolic blood pressure, BPC= blood pressure control, MRA= medication refill adherence

Table 1 shows no significant statistical difference in baseline characteristics of both intervention and control groups as regards age, sex, SBP, DBP, BP control, BMI and medication refill adherence.

Intervention Change Of Systolic And Diastolic Blood Pressure

Table 2: Comparison between intervention and control groups regarding systolic and diastolic BP.

Parameters		Mean	±SD	Paired Samples t-test	
				t	p-value
Systolic blood pressure	Systolic control	152	13.4	9.4	<0.001
	Systolic intervention	139.3	14.2		
Diastolic blood pressure	Diastolic control	90.5	6.8	9.5	<0.001
	Diastolic intervention	85.25	9.3		

Table 2 shows high statistically significant difference in DBP between control and TERM group after intervention as regards to both SBP and DBP

Figure 1: Comparison between control and TERM group at baseline and after intervention as regards to BP control

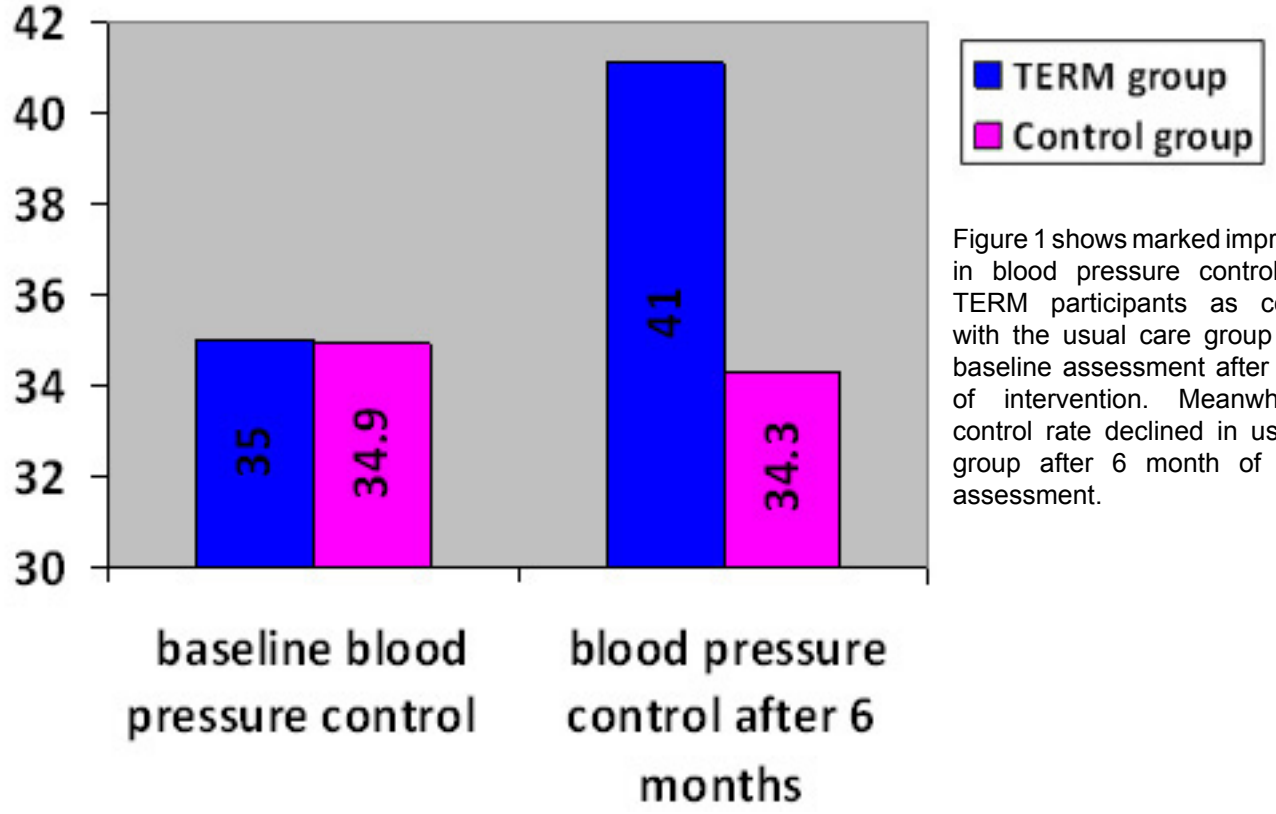

Figure 1 shows marked improvement in blood pressure control among TERM participants as compared with the usual care group and the baseline assessment after 6 month of intervention. Meanwhile, the control rate declined in usual care group after 6 month of baseline assessment.

Post Intervention Change of Medication Adherence

Figure 2: Percentage of refilling in TERM vs control group at base line and after 6 months

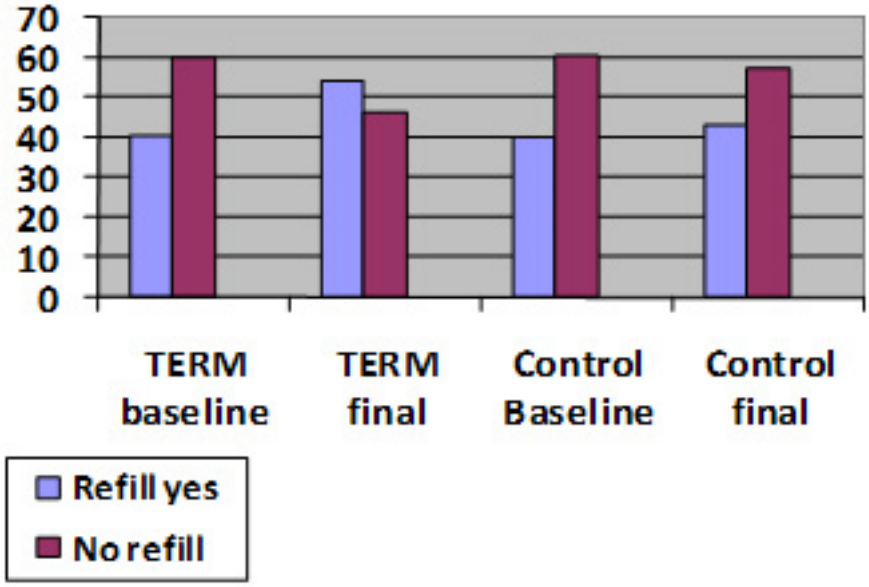

Figure 2 illustrates significant improvements in refill adherence among TERM participants compared to usual care group (54% vs. 43%, P =<0.001). There was also significant improvement within the TERM group in regard to refill adherence after 6 months of intervention compared to usual care group (54% vs. 40.2%, P =<0.001).

Post Intervention Changes of Smoking Habit

Figure 3: Smoking status in TERM and control groups at baseline and final

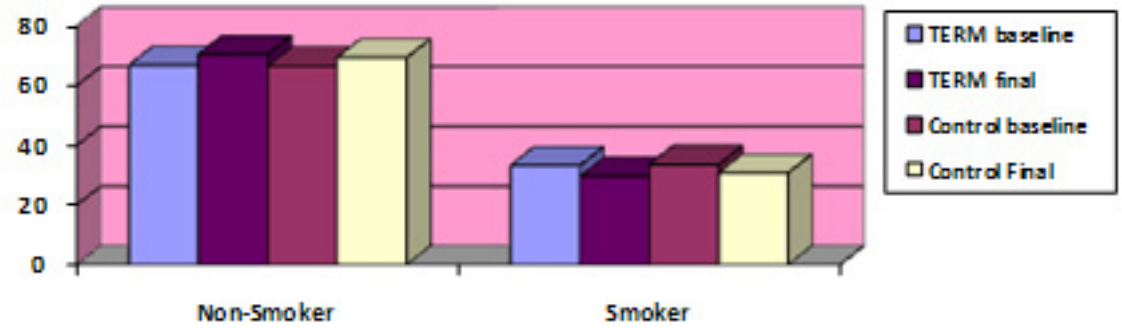

Figure 3 shows more improvement in smoking quit rate among TERM participants(3.9%) compared to usual care group (0.2%). Similarly there was improvement in smoking cessation within the TERM participants after 6 months of intervention (3.6%) compared to baseline, the case which was not found among the usual care group.

Post Intervention Changes Of Cholesterol, Triglycerides, BMI and HbA1c

Table 3: Comparison between intervention and control groups regarding total cholesterol, triglycerides, BMI and HbA1c.

Parameters		Mean	±SD	Paired Samples t-test	
				t	p-value
HbA1c	HbA1c control	7.2	0.87	1.37	0.171
	HbA1c intervention	7.1	1.1		
BMI	BMI control	29.26	6.26	1.91	0.058
	BMI intervention	29.02	6.16		
Total cholesterol	TC control	216.51	32.32	1.44	0.153
	TC intervention	213.93	27.05		
Triglycerides	TG control	147.71	29.52	1.36	0.174
	TG intervention	146.61	27.97		

Table 3 shows insignificant difference between TERM and control group as regards to mean HbA1c, BMI, total cholesterol and triglycerides.

Discussion

Fortunately, adequate blood pressure (BP) control can reduce mortality and produce significant cardiovascular benefits in all patients.(4,5) It is striking that blood pressure goals continue to be achieved in only 25–40% of the patients who take antihypertensive drug treatment, which is a statistic that has remained unchanged for the past 40 years.(2,6,8) In our study BP was found largely uncontrolled (65% and 65.1%) in base line assessment of intervention and control groups respectively, despite the fact that all UAE citizens have free access and utilization of all health care services. Unsurprisingly, many other studies found, like ours, high rates of uncontrolled HTN among patients with free access to health care. (6–8,18) This indicates the presence of multiple determinants of hypertension control other than availability and utilization of free services.

Many cluster randomized trials from different countries evaluated various educational and organizational approaches to improve blood pressure control rates in primary care (22-36). Most of these studies applied educational sessions for physicians and/or patients in combination with newly designed external support structures (24-31). Two types of external support structures can be differentiated. The first category comprises electronic reminders on self-care (26) and the second category used physician-support structures, either by external study/audit centers or clinical pharmacists.(28-31) The effects of these interventions vary from a mean group difference of - 0.2 mmHg (31) to −10.3 mmHg in systolic blood pressure(29)

and from - 0.4 mmHg(31) to −4.6 mmHg in diastolic blood pressure.(28)

Interventions aimed at changing regular care need to be based on an in-depth understanding of the health care system that they are addressing (15). We designed the present study for the Sharjah primary health care system, which is based mainly on primary health care centers that are regionally distributed in the various neighbourhoods close to their patients. These practices typically serve both UAE citizens and expatriates with free services offered only to UAE citizens. Imbibing the important milestones set by the above referenced studies, we tried to conceptualize a study which was based only on team performance without any external support system addressing the team-based care as the master of the practice.

Our study revealed significant improvement in medication refill adherence in TERM patients compared to the usual care group after 6 months of intervention (54% versus 43%, P =<0.001) with significant improvement in SBP (139.3 ± 14.2 versus 152±13.4), DBP (85.25 ±9.3 versus 90.5 ±6.8) and overall blood pressure control (41 % versus 34.9%). In a similar study, at 6 months, intervention participants achieved greater improvements in refill adherence (60% versus 34%, P < 0.001), SBP (-12.62 versus -5.31 mm Hg, P < 0.001), and blood pressure control (50% versus 36%, P = 0.01) compared to a usual care group in primary health care settings. (22) A similar study reported comparable differences where the intervention group had a mean reduction in systolic BP at 6 months of 18.3±1.2 compared with 11.8±1.9 mm Hg in the usual care group. (17) In contrast to these findings, another study showed no difference in SBP after a 14-month intervention compared to usual care group (-8.9 mm Hg in the intervention group in comparison with -9.0 mmHg in usual care group). (12)

In another study, the proportion of adherent participants to medication refill increased in both intervention and control groups compared to base line assessment but with insignificant difference between the two groups [57•2% to 63•6% (control) versus 60•0% to 73•5% (intervention), P = 0•23]. The mean reduction in systolic BP was significantly greater in the intervention group (10•0 mmHg versus 4•6 mmHg; P = 0•05). (23) These findings show the importance of evaluating the effectiveness of different trials in real-life clinical settings before widespread adoption in all settings.

In the present study, there was also significant reduction of smoking (3.9 % in TERM participants versus 0.2% in control group P< 0.001); however, there was no significant difference in the HbA1C, lipid profile or BMI amongst the two groups. These results were expected as most of the studies revealed effectiveness of any motivational intervention even to the level of simple advice on the overall cigarette quit rates.(37) However, blood lipids and weight control need more specific interventions that may require a more sophisticated approach that combines diet, exercise and drug treatment. In addition studies of short duration like the present one are unlikely to yield enough health-related outcome information to permit interpretation of intervention effects.

In our study, the significant reduction difference after 6 months from baseline between TERM and usual care group, in not only the systolic but also the diastolic blood pressures) and overall blood pressure control has proven that an overall management package of physician education, patient education, nutritional and exercise advice, intensification of medication adherence, has definitely proven its mettle.

The limitation of this study lies in the fact of lacking a randomization factor, as well as a few shortcomings of data collection variables namely the appropriate classification of period of hypertension, current medications for hypertension or any comorbidities as well as the dosages, lack of quality of life assessment (EQ5D questionnaires), and mental status assessment. Furthermore, there could be a Hawthorne effect, where there is a tendency of some people to work harder and perform better when they participate in an experiment. One of the most frequently occurring barriers against medication refill adherence was that local drug dispensing regulations allow UAE citizens to collect their medication from any PHC center whenever they are overdue. Finally, lack of staff and crowded practice posed the biggest challenge to implementation of the study. Future randomized studies incorporating these factors shall pave a more scientific proof for this TERM initiative.

Conclusion

A team-based 6 months educational intervention involving doctors, pharmacists and nurses combined with simple medication intensification tools like monthly SMS and follow up phone calls led to significant improvement in medication refill adherence, SBP, DBP and hypertension control among adult hypertensive citizens, in a primary health care setting, Sharjah Medical District, UAE. This trial can be considered fruitful in lieu of the significant results obtained as hypothesized.

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