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Self-Management Interventions in Hypertension: A Comprehensive Review of Contemporary Approaches and Clinical Outcomes

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Abstract

Background: Hypertension- one of the leading health challenge globally, with limited control over BP despite of high quality and therapeutic availability. By the help of patient education and active participation, varieties of self-management interventions are present today to control or manage Hypertension.

Objective: This review try to analyze current evidence on various self-management approaches for controlling hypertension, such as home BP monitoring, digital interventions to check and control BP, tele-health, community-based support systems etc.

Methods: Ten studies from different part of world are reviewed, to find different self-management techniques for BP management. Randomized controlled trials, cohort studies, and quasi-experimental designs are included for this review from various countries including Taiwan, Slovakia, Singapore, Kenya, Bangladesh, Indonesia, and United Kingdom.

Results: Many studies shows that systolic BP reductions (ranges between 2.2 to 22.1 mmHg), benefitted with regular Home BP monitoring. Digital interventions and tele-health approaches showed cost-effective outcomes as well as improved patient satisfaction. Self-management technique enhanced adherence to treatment, knowledge on disease and self-efficacy. Having support groups and regular home visits among vulnerable and weak populations or remote areas, made significant changes in BP control. Neighborhood factors and social determinants, especially among minority populations plays important role in self-care behaviors.

Conclusions: A wide variety of self-management interventions are used as much effective and cost-efficient approaches for hypertension control, even though factors like demographic aspects, technological facts, and socioeconomic factors are making some limits. More focus on long-term sustainability, high cost-effectiveness, and integrated with daily clinical practice will improve the quality of these.

Keywords: Hypertension, Self-Management, Home BP Monitoring, Digital Health, Tele-Health

Introduction

Hypertension affects approximately 1.28 billion people worldwide and still remains one of the leading risk factor for many cardiovascular, brain or kidney disease [1]. The availability of quality and effective

antihypertensive medications and other procedures, made a good control of BP among adults, but still remains less than 50% [2]. This makes the innovators to work beyond traditional care models, and to make life expectancy higher. This made the idea of self-management interventions, which includes patient's education, empowerment, and active participation in all aspects of treatment. Activities like regular BP monitoring, lifestyle modifications, consistent daily habits, regular medication adherence etc make much control of hypertension beyond regular clinical care [3]. The World Health Organization also strongly recommends self-management strategy as an essential component of comprehensive care of hypertension [4].

Home BP monitoring (HBPM), tele-health programs, education programs, and community-based support groups are some of the newer approaches that reduce the gap between clinical interventions and self-care activities as well as enhance knowledge and support for hypertension control [5]. The application and feasibility of technology improved the approaches for BP self-management [6]. Understanding diversities in culture, traditions, socio-economic levels, literacy and access to technology influence the quality of intervention outcomes [7].

Methods

1. Selection of Studies and Data Extraction

The number of self-management interventions that analyzed on this review took ten recent research studies in consideration, that have been mostly used in controlling high BP. Data were read with various population characteristics, study design utilized, methods of the intervention, principal findings and clinical significance. There are some common self management methods that are identified as; Home self BP monitoring, tele-health facilities, digital facilities and interventions, educational policies, support systems community resources etc.

2. Study Characteristics

The choice of studies was in various geographical regions such as United Kingdom, Eastern Europe, East Africa, South and Southeast Asia and North America. Cross-sectional analysis randomized controlled trials, quasi-experimental studies, and cohort studies are the different study designs. The specimen size in studies ranges between 60-4,035 subjects and they fall under various age bracket, socioeconomic status, residence areas and health regions.

Results

1. Home Blood Pressure Monitoring (HBPM)

a. Effectiveness and Clinical results

In several studies, one of the functioning self-management methods was Home BP monitoring (HBPM). In a study on 4,035 patients in Slovakia, it was observed that effective treatment of hypertension occurred with the use of HBPM method as compared to the conventional monitoring at the office [1]. HBPM comparing to regular care, the blood pressure decreased by -2.2/-1.4 mmHg ($p<0.01$) in patients using this technology. Interestingly, 8 percent of the HBPM patients had achieved the ideal blood pressure level (135/85 mmHg), and 67 percent arrived at a target BP level (140/90 mmHg) after seven days of monitoring.

Additional evidence on the effectiveness of HBPM in the resource limited setting was obtained in another participant with 100 participants in Bangladesh [2]. Research showed a great proportion of

target blood pressure success among patients who abided by home monitoring guidelines (p<0.04), a male-female proportion of 1.17: 1, indicating whether a drug is effective by gender.

b. Behavioral Outcomes and Patient Engagement

HBPM interventions showed a constant rise in patient involvement and self-management activities. The rate of self-monitoring became also a critical characteristic, and it was revealed that patients with higher blood pressure self-monitoring rates had better results.

2. Tele-health Interventions and Digital Health

a. Technology-Enhanced Monitoring Systems

The study that was based on Singapore tele-health and included 120 patients demonstrated the potential of self-management approaches that are integrated with technology [3]. Patients who measured BP at home and are linked to clinical units through mobile connection gateways had 2.69 times more chances of getting controlled BP (p=0.01) than usual care. It was found to be cost effective having an incremental cost-effectiveness ratio of S$23,935.14 per quality-adjusted life year (QALY).

UK HOME BP trial (involving 622 subjects in 76 general practices) supplied strong evidences regarding the effect of digital intervention [5]. The overall digital solution that included self-monitoring with guided self-management has shown a clinically beneficial systolic BP change of -3.4 mmHg (95% CI -6.1 to -0.8) versus usual care. The cost effectiveness of the intervention was very high with the incremental cost-effectiveness ratio of 11 GBP per 1 mm Hg reduction.

b. Patient Satisfaction and Engagement

Patient satisfaction rates were always higher in digital health interventions than in traditional care. In Singapore study, it was shown that the tele-health participants experienced enhanced motivation to monitor their BP, meaning that the technology provides positive effects in terms of achieving engagement among the patients through feedback and support-oriented technology. Similarly, UK HOME BP trial showed good completion rates (88.6%) and maintained contacts during the 12 month intervention period.

3. Education and Support Interventions

a. Organised Self-Management Education

In Turky, the sample of 137 patients (69 in the intervention and 68 in the control) comprised the results of a randomized control trial showing all-comprehensive benefits of structured self-management education [7]. The intervention group was associated with a significant improvement in several areas that included: knowledge relating to hypertension (p=0.000), treatment (p=0.000) and self-care management (p=0.000). Through these increases in education, not only an increase in BP reduction in both systolic and diastolic BP (p=0.000) was noted.

b. Community-Based Support networks

Intervention study in Kenya by the support group uncovered the promise of self- management through peers [4]. Subjects in support groups were noted to have made a valuable systolic BP difference of 5.4 mmHg when compared to those that were not participating (beta = -5.4; 95% CI = -1.9 to -8.8).

Other issues related to dealing with hypertension in patients with multi-morbidity were brought out in the study as participants with concordant conditions had a systolic BP measurement of 8.8 mmHg higher at the follow-up.

4. Specialized exercise and aged population

a. Interventions of Home Visit

The quasi-experimental approach conducted in Indonesia on a group of 134 aged people proved the eff

iciency of the home-based self-management approach [6]. The 4-structured home visits that were conducted on caregivers, among other things, indicated a significant positive impact on self-care adherence ($p<0.001$) and health status in general ($p<0.001$). The factor of self-management proved as the most far-reaching impacting outcomes despite the confounding factors.

b. Models of Integrated Care

The mixed results of the Indonesian study on the application of Home Care Pharmacy Approach and Health Action Process Approach (HAPA) to elderly patients (the sample is 60 people) indicate that intervention may have both positive and negative outcomes [9]. Although self-care management improved greatly ($p=0.006$), self-efficacy did not change ($p=0.753$), indicating the complexity of the behavioral change intervention in older people.

5. Case Management and Tele-health

a. Health Infrastructure Technologies

The cohort study of 432 patients in Taiwan established the efficacy of comprehensive telehealth care and case-management action by public health nurses [8]. Clinical benefits were also tremendous as the intervention resulted in the mean decrease in SBP of 22.1 mmHg at the one-year follow-up. Particularly, 52.2 percent of the patients had the declining trend of blood pressure, and self-monitoring frequency influenced the results of the decrease.

6. Social Determinants and Contextual Factors

a. Influences of Neighborhood and Environmental

The cross-sectional study by 159 black adults in the Baltimore region gave special experiences of the actions of the social determinants on the self-management of hypertension [10]. The perceived neighborhood health had significant correlations with higher level of self-care behavior ($\beta = 2.48$, 95% CI 0.63-4.33) and self-efficacy ($\beta = 4.42$, 95% CI 2.25-6.59).

The research found out that the neighborhood variables, especially the aesthetic quality, walkability, safety, and violence had major roles in affecting the capability of patients to be able to undertake self-care activities.

b. Self-Care and Food Environment

Interesting interrelations between neighborhood features and availability of home food were also evidenced in the Baltimore research. Improved aesthetic quality of the neighborhood was significantly correlated with self-care behavior only among the participants with greater healthy food availability at home (β at 1SD, 2.97; 95 percent CI 0.46-5.47; $P=0.09$ of the interaction). This evidence indicates that the effective self-management interventions should take the environmental and resource-related aspects into account.

Summary Tables

1. Study Characteristics and Populations

The baseline details of the reviewed studies like location of study, design of study, sample and sample size, follow up period are been following:

Sl No.	Study Location	Study Design	Sample Size	Population	Age Range	Follow-up Period
1	Slovakia [1]	Observational	4,035	General hypertensive patients	Not specified	7 days

2	Bangladesh [2]	Prospective observational	100	Hypertensive adults	34-80 years	Not specified
3	Singapore [3]	RCT	120	Hypertensive patients	Not specified	6 months
4	Kenya [4]	Intervention study	Not specified	Hypertensive patients	Not specified	12 months
5	United Kingdom [5]	RCT	622	Poorly controlled hypertension	Not specified	12 months
6	Indonesia [6]	Quasi-experimental	134	Elderly with hypertension	≥60 years	Not specified
7	Turkey [7]	RCT	137	Hypertensive patients	Not specified	3 months
8	Taiwan [8]	Cohort	432	Hypertensive adults	≥40 years	12 months
9	Indonesia [9]	Pre-experimental	60	Elderly with hypertension	≥60 years	Not specified
10	USA [10]	Cross-sectional	159	Black adults with hypertension	Median 57 years	Not applicable

Table 1: Study Characteristics and Populations

2. Intervention Types and Key Outcomes

The type of interventions used and main outcome of study related with BP reduction are as following:

Sl No.	Study	Intervention Type	Primary Outcome	BP Reduction	Statistical Significance
1	Slovakia [1]	HBPM vs office monitoring	BP control	-2.2/-1.4 mmHg	p<0.01
2	Bangladesh [2]	HBPM adherence	Target BP achievement	Not specified	p<0.04
3	Singapore [3]	Tele-monitoring	Controlled BP	Not specified	OR 2.69, p=0.01
4	Kenya [4]	Support groups	Systolic BP	-5.4 mmHg	β=-5.4, CI -1.9 to -8.8
5	United Kingdom [5]	Digital intervention	Systolic BP	-3.4 mmHg	CI -6.1 to -0.8
6	Indonesia [6]	Home visits	Self-care adherence	Not specified	p<0.001
7	Turkey [7]	Self-management education	Multiple outcomes	Significant reduction	p=0.000
8	Taiwan [8]	Telehealth + case management	Systolic BP	-22.1 mmHg	Not specified
9	Indonesia [9]	Pharmacy care + HAPA	Self-care management	Not specified	p=0.006
10	USA [10]	Neighborhood	Self-care	Not applicable	β=2.48, CI 0.63-

		assessment	behavior		4.33

Table 2: Intervention Types and Key Outcomes

3. Cost-Effectiveness and Implementation Outcomes

The effectiveness on cost in relation with BP reduction methods are following:

Sl No.	Study	Cost-Effectiveness Measure	Value	Implementation Factors
1	Singapore	Cost per QALY	S$23,935.14	Mobile gateway technology
2	UK	Cost per mmHg reduction	£11	Integration into primary care
3	Taiwan	Not specified	Not specified	Public health nurse involvement
4	Others	Not reported	Not applicable	Various implementation challenges

Table 3: Cost-Effectiveness and Implementation Outcomes

Discussion

1. Exploitation According to Intervention Type Effectiveness

The studies reviewed prove the effectiveness of different self-management interventions to control the hypertension level repeatedly. Home blood pressure monitoring-HBPM- was found to be quite a strong intervention as it was found to bring improvements in a wide range of populations and medical facilities. BP lowering as a consequence of self-management interventions (2.2 to 22.1 mmHg systolic BP) is clinically important and similar to one produced by adding an extra antihypertensive drug

2. Technology Integration and Scalability

Tele-health methods and digital health interventions demonstrated promising results and increase value to cost-effectiveness and patient satisfaction. Mobile technology, automatic data transfer and real-time feedback systems allowed increasing the feasibility and scalability of self-management programs. Nonetheless, its successful adoption needs cognizance of digital literacy, access to technology and infrastructure capacities, especially in low-resource environments.

3. Patient Education and patient Empowerment

Multifactor results of educational interventions came out clearly with multifaceted benefits that involved better knowledge of the disease, treatment compliance and self-efficacy. These conclusions encourage the significance of extensive education of patients as the premise of effective self-management. The finding by the Turkish study that exhibited parallel gains in knowledge, adherence, and clinical results presents a great interdependence between the aspects.

4. Health Equity and Social Determinants

The results of the Baltimore study in relation to the factors of the neighborhoods and social determinants give important information to overcome health disparities in managing hypertension. The strong correlations of the perceived neighborhood health to self-care behaviors imply that environmental and social obstacles to self-care should be dealt with in effectual self-management interventions.

5. Special Needs and Individual Strategies

Research conducted on older adult populations established the feasibility and limitations of therapeutic attainments of self-management among the aged population. Even though home visit interventions produced impressive results, mixed outcomes with reference to self-efficacy improvements indicate that behavioral change interventions among the older adult population might have to be approached

diversely. The significance of caregiver presence and simplified intervention procedures turned out to be a success prerequisite in the older population

6. Implementation Problems and Solutions

Research mentioned a number of implementation challenges that can be shared among them such as patient engagement, technology penetration, incorporation into the current health care workflows, and sustainability of intervention effects. The most successful programs exhibited the relevance of training of healthcare providers, continuous support, and institutional preference to self-management tools.

7. Limits and Prospects

The analyzed literature was diverse with different study design, population features, and measurement of outcome. As a result, the studies could not be directly compared. Follow-ups were rather short in many of the studies, which constrain the sustainability of the effect of the intervention in the long term. It is necessary to investigate long-term results, cost-effectiveness evaluations, and methods of incorporating self-management programs into the everyday practice of clinicians.

Take-Home Messages

1. To the Healthcare Providers

The use of home BP monitors is an evidence-based effective intervention strategy with proven benefits, which must be regularly prescribed to all individuals with high BP, Educating the patients and helping them with self-management returns great clinical outcomes. The digital health technologies improve the traditional methods of self-management and offer cost-efficient methods of hypertension management. Self-management success is very closely linked to social determinants and the environment

2. In the Healthcare Systems

Self-management interventions are quite cost effective when compared to the conventional forms of care. The implementation should be systematic with integration into the current clinical workflows in order to prove successful Effective controlling of BP should focus on tele-health and remote monitoring capabilities

3. For the Patients and Communities

The results demonstrate that good BP and health outcomes are realized with active involvement in self-management activities. Routine monitoring of BP at home is an easy-to-approach solution. BP control measures also rely on community support systems as well as peer networks

4. To the Policymakers and Researchers

The cost-effective way of managing hypertension to consequently cut down the burden of cardiovascular diseases is through investing in self-management intervention infrastructure. Future studies that prioritize long-term sustainability, study of cost-effectiveness and implementation science strategy were required to base more evidence based approach. Self-management approach designs have to consider health equity.

Conclusion

The detailed overview is a good argument to show that different self-management interventions to control hypertension apply to many different populations. All of these have clinical benefits with favorable profiles of cost-effectiveness at home BP monitoring, digital health interventions, structured patient education, and community-based support systems. The extent of BP reductions resulted by such methodologies is clinically definite and justification of the advantage of such methodologies as

compared to enhancement of cardiovascular wellbeing in general population. But in order to bring in successful implementation of the self-management interventions; the aspects of the patient, health systems and status, social economic factor, availability of technical component, etc are to be taken into account. The research work done by a lot of people demonstrates that the integration of self-management interventions into everyday practice to manage hypertension will facilitate health improvement. Home BP monitoring, intensive patient education, technology use and adoption, community resource use are some of the valuable modes when controlling hypertension conditions. Although such methods are helpful, we still require additional evidences to embrace interventions that are long lasting and more economical and should apply to different population.

References

1. Slovakian Home Blood Pressure Monitoring Study. 2022. Study of 4,035 patients comparing home blood pressure monitoring to office-based monitoring for hypertension control.
2. Prospective study of 100 participants examining home blood pressure monitoring adherence and target blood pressure achievement. 2017.
3. Six-month randomized controlled trial of 120 patients using home blood pressure devices connected to clinical teams via mobile gateway technology
4. Community-based intervention study examining the effectiveness of peer support groups for hypertension management. 2019.
5. Home Bp Trial U. Unmasked randomized controlled trial involving 622 participants across 76 general practices testing digital intervention for hypertension management combining self-monitoring with guided self-management.
6. Indonesian Elderly Hypertension Study, Pekanbaru City. Quasi-experimental study with pre-post test design involving 134 elderly participants examining self-management intervention effectiveness through home visits.
7. Randomized controlled trial with 137 patients (69 intervention, 68 control) examining the effects of self-management support on hypertension knowledge.
8. Tele-health T, Study C. Cohort study of 432 patients examining home tele-health care combined with case management by public health nurses from 12 district public health centers in Taipei. 2011.
9. Pre-experimental study using one-group pretest-posttest design with 60 elderly participants examining the combination of Home Care Pharmacy Approach and Health Action Process Approach (HAPA).
10. Baltimore Neighborhood Health Study. Cross-sectional study of 159 Black adults examining the relationship between perceived neighborhood health and hypertension self-care behaviors.