The Impact of a Blood Pressure Monitoring Wellness Program on Adults with Hypertension

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Abstract

Hypertension is a national health concern that can increase the risk for cardiovascular disease. Healthy People 2020 recommends improving cardiovascular health by increasing the number of adults who check their blood pressure and understand whether it is high or low. In an effort to improve outcomes in adults with hypertension, this quality improvement project was implemented at a primary care setting aimed at improving blood pressure control through self - care behaviors. The intervention included providing staff education on the HBPM program called IHEALTH, an educational counseling session for recruited participants (adults ages 21- 85 with a diagnosis of HTN within the last year or uncontrolled HTN) in which a pre-test blood pressure knowledge and self-care scale on hypertension were administered. There were statistically significant improvements in BP from pretest to posttest on the average the Mean Arterial Pleasure (MAP) and Systolic BP. The MAP decrease from an average of 105.7 to 100.4 [t(7)=2.32, p=.027, Cohen's D=1.76] whereas the SBP decrease from an average of 142.9 to 128.4 [t(7)=2.74, p=.015, Cohen's D=2.07]. There was a small but nonsignificant decrease in DBP from an average of 87.1 to 86.4 [t(7)=0.17, p=.868, Cohen's D=0.129]. The pre-intervention knowledge scale rose from a mean score of 69 to a mean score of 88 on the post test. The post intervention pre-intervention self-care score rose from an average of 44 to a post intervention average score of 75. The project showed that the implementation of a quality improvement project in a primary care setting with staff involvement can lead to participant blood pressure control through promotion of participants self-care behaviors. Therefore, implications for practice include incorporating HBPM programs into practice due to the high potential for improving blood pressure control through self-care behaviors. In addition, the

implementation of a HBPM program in addition to office blood pressure is important for diagnosis and monitoring HTN (Kairo et. al., 2019).

Keywords: HTN (hypertension), RPM (remote patient monitoring), QI (quality improvement), HBPM (home blood pressure monitoring)

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Call for Nursing

Sadly, lack of engagement in health promoting behaviors to HTN treatment has been an ongoing challenge for clinicians at the clinic where I practice. Recently, I cared for a 69-year-old female known as C.M. Her initial blood pressure was 175/ 110. So, I asked whether or not she has a history of HTN. She said that she was prescribed medication two years ago and only took it for thirty days. Upon reassessment, I checked her blood pressure and gave her a dose of 0.1 mg of clonidine. Afterward, she was started on Norvasc 10 mg and Hydrodiuril 12.5 mg daily. She was also given a blood pressure log, education on the DASH diet, lifestyle changes and importance of following the hypertension treatment plan. She was advised to follow up in seven days with her logs. Later, she thanked me and said that was she confident in her ability to follow the treatment plan. As a DNP student at the College of Nursing, the leader of this project has responded to the call by actively working to improve blood pressure control by providing education on healthy behaviors and lifestyle changes in a compassionate manner. Ultimately, this will help to prevent or delay long term consequences.

Background / Problem Statement

Hypertension (HTN) is a chronic disease that primarily results in vascular dysfunction that can lead to end organ damage (Fitzgerald, 2017). The CDC (2020) defines hypertension as having a blood pressure of 130/80 or higher or taking hypertension medication. In addition, HTN requires a lifetime of management that may be difficult for some individuals to follow. A few reasons that patients do not engage in health promoting behaviors that align with the treatment

regimen include health literacy issues, lack of follow-up, a fear of dependence and social determinants of health (Burnier & Egan, 2019; Carey et. al, 2018).

Project Evolution

I have identified that hypertension management is a problem at the community health center and have been asked by staff to develop a project to intervene. The problem I would like to address is to improve one's ability to engage in self-care behaviors to achieve better blood pressure control. My clinical question is, how does an evidenced-based home blood pressure monitoring and wellness program, in adults with uncontrolled Hypertension, affect knowledge, blood pressure control and self-care over a four-month period?

Purpose Aim

The purpose of this evidence-based quality improvement project was to determine the effectiveness of a protocol for blood pressure follow-up monitoring in the primary care setting on adults with HTN.

Team Development

Debra Hain, PhD, APRN, AGPCNP-BC, was the project faculty team member, with specialization in nephrology. Nakeisha Kinlaw-Williams, DNP, APRN, AGNP-BC was the community team member and leads the chronic disease clinic at the Community Health Center of West Palm Beach. Jasmine Wilcox, the project leader, a board-certified family nurse practitioner, APRN, ANP-BC has been a nurse since 2013. She has seen the drastic affects that can occur as a result of uncontrolled hypertension. The more patients with hypertension that she has cared for over the years, the more she has realized that many individuals believe that once the diagnosis of

hypertension is made it just goes away. Ultimately, this inspired her passion to pursue a quality improvement project on hypertension in order to improve patient health related outcomes.

Literature Review and Synthesis

A review of current literature was done to determine the effective of a HBPM program on HTN management. This program is based on a nine-month study that was done at a clinic in New York, in which systolic blood pressure decreased by nine percent (Yi et. al., 2015). Additionally, randomized control trials, systemic reviews /meta- analysis and retrospective medical analysis were reviewed, supporting the use of a HBPM program in improving blood pressure with clinical support (Muhammad et. al., 2019; Scakacs et. al., 2016; Uhlig's et. al., 2013; Omboni & Guerda, 2011). In another study done by Kairo et. al., (2019), a HBPM program was determined to be an important adjunct to office blood pressure for diagnosis and monitoring. A randomized control trial was done by Cuffee et. al., (2018) found that after a three-month study, there was a reduction in blood pressure with HBPM along with the incorporation of health education and healthy behaviors. Additionally, the USPSTF (2016) recommends HBPM in the screening and diagnosis of hypertension. The evidence presented supports this quality improvement project by showing that a HBPM program has proven to be successful in similar settings, thereby leading to positive outcomes. This enhances the patient's awareness of the disease process and would benefit the patients with hypertension receiving care at the clinic.

Conceptual or Theoretical Framework

Translational Change Theory

The Translational Change Theory is a model created by Pronovost et. al., (2008) in order to implement research into practice. The theory is based on four phases that include summarizing

evidence in order to improve outcomes, identify barriers of implementation, identify outcomes of the implementation / performance measures, and ensure all participants accurately receive the intervention (Dudley-Brown et. al., 2012). Furthermore, the interventional change would be implementing the HBPM into practice. This would consist of initial staff education and participant pre / post intervention education. Lastly, a baseline comparison of pre-knowledge / self-care survey and blood pressure logs would be done and then again post intervention at the end of the study.

(Translational Change Theory diagram inserted as Appendix C)

As a DNP student at FAU, caring science is at the heart of everything we do. Furthermore, Milton Mayeroff's caring ingredients will inform the development and implementation of the project as the DNP student will be authentically present and aware of what matters most to the participant. "In helping a person to grow you help the person care for himself and become responsible for their own life" (Mayeroff, 1983). Furthermore, I provided a caring environment to help participants learn about HTN, take their medications as prescribed and support engagement in self-care behaviors. Ultimately, these interventions helped participants to be knowledgeable and confident in managing their hypertension.

Project Processes (Steps)

Permission from the Agency

The project was implemented at the Community Health Center of West Palm Beach. The office manager at the community health center granted permission (letter inserted as Appendix A) for the project to be conducted at the community health center. The project ended on September 30, 2021 following the work day at 2pm.

Recruitment of Participants

From June 10, 2021 to July 13, 2021, the project leader invited eligible participants (ages 21-85 with uncontrolled hypertension and/ or a diagnosis of hypertension within the last year) attending the chronic disease clinic at the health center.

Protection of Participants (confidentiality)

The participants personal information was kept completely confidential and not shared or otherwise made known to unauthorized persons. All paperwork and surveys were stored electronically on Athena and IHealth.

Intervention

Two days of the week the project leader invited eligible participants (n = 22) that were willing to enroll in the QI program. The project leader conducted weekly phone calls that included teaching on the DASH diet and importance of exercise / medication compliance. In addition, weekly blood pressure logs were reviewed through IHealth with follow up on any concerning blood pressure readings.

Staff Engagement

Initial program called IHealth Care, provided education on the HBPM program called IHealth Care. Thereafter, weekly meetings were held in order to gather information and debrief. Ultimately, a team-based approach (team members include project leader, community leader, clinical staff and virtual care staff) helped incorporate a multidisciplinary team to improve the quality of HTN care for participants.

Patient Instructional Session

Initial session: As participants were recruited, the project leader conducted a 20 minute one on one session with each participant. An unoccupied waiting area at the community

health center was used in order to conduct the sessions. During the initial session participants completed a Pre-Test Blood Pressure Knowledge and Self Care Scale survey on hypertension. Once baseline knowledge was assessed, the project leader educated participants on the importance of diet, exercise, following up with PCP as ordered and medication compliance. In addition, participants were instructed on how to check their blood pressure, set up their IHealth account and were given their IHealth Sense Wireless Wrist Blood Pressure Monitor. Furthermore, evidenced based research has shown that IHealth Blood Pressure Monitor successfully monitors blood pressure (Mazoteras-Pardo et., al., 2019).

Follow up session: The project leader conducted regular weekly follow up calls, to encourage blood pressure tracking, taking medication and counseling about lifestyle changes. The survey was re-administered via telephone at the last follow up session.

Data Collection and Management: Blood pressure logs of participants were tracked weekly through IHealth. The project leader compared monthly blood pressure to track progress of each participant. At the end of the study data from the pre and post surveys were compared.

Cost: In order to conduct this quality improvement program, IHealth wireless blood pressure machines were provided through the clinic and the readings were track and stored through the IHealth application. (IHealth, 2021). Therefore, since the wireless blood pressure machines were donated to the health center by a vendor, no cost were incurred.

Tools / Instruments

To determine the effectiveness of this quality improvement project, participants were asked to complete a knowledge scale and self-care scale survey on hypertension. Knowledge and Self Care Scale (Appendix D): The Blood Pressure Knowledge and Self Care Scales,

developed by Peters and Templin (2008) were used. These scales are based on Orem's self-care deficit nursing theory and were utilized to measure participants' knowledge and self-care practices pre /post HBPM intervention. The scales used helped determine the efficacy of the counseling session to enlist participant engagement to determine improvement in BP and lifestyle changes. The Knowledge Scale consists of 11 questions and the Self Care Scale is a 10-item questionnaire (Peters et. al., 2008).

Results

Overall, the analysis of the results was encouraging in some areas and could stand room for improvement in other areas. The recruitment process was a success. The project leader was able to successfully recruit a total of 22 participants, which helped meet the initial goal of 20 – 40 participants. But, of the 22 participants who were recruited, 12 patients stopped checking their blood pressure at some point, leaving 8 participants who completed the QI project. The project leader did not meet the goal of having 75% participation in completing the pre – post evidence- based survey, as only 60 percent of the participants completed the survey pre-test and only 40 percent completed the post-test survey. Although the project leader was able to meet the goal of making monthly maintenance phone calls to all participants, as time went by some participants stopped answering their phone and/or stopped checking their blood pressure. As a result, weekly phone calls were made in order to increase the participants ability to engage in self-care behaviors and encourage self-care behaviors. In addition, 40 % of the participants successfully reported engagement in self care behaviors by July. The pre-intervention knowledge scale rose from a mean score of 69 to a mean score of 88 on the post test. The post intervention self-care scale score rose from an average of 44 to a post intervention average score of 75. Table A displays the individual results for the Blood Pressure Knowledge Scale. Table B

displays the results for the Blood Self Care Scale. As displayed by the results, blood pressure knowledge can increase through counseling, blood pressure monitoring and the implementation of the self-care behaviors.

Table A:

Participant ID	Blood Pressure Knowledge Scale Pre-Test Score	Blood Pressure Knowledge Scale Post-Test Score	Age	Gender
202.	67	37	64	M
303.	64	34	60	F
707.	58	33	60	M
909.	51	47	38	M
1013.	77	53	64	F
1019.	70	47	59	F
1020.	73	41	60	M
1022.	77	60	61	F

Table B:

Participant ID	Blood Pressure Self-Care Scale Pre-Test Score	Blood Pressure Self-Care Post Test Score	Age	Gender
202.	78	45	64	M
303.	63	32	60	F
707.	68	70	60	M
909.	60	65	38	M
1013.	75	59	64	F
1019.	73	60	59	F
1020.	77	69	60	M
1022.	75	65	61	F

In regards to blood pressure, 75% of participants did not report a systolic and diastolic pressure 7% lower than the baseline and reach their individual blood pressure goals by August. This goal was not met as the study lasted until September. In addition, out of 22 participants who started the study, only 8 completed the study. Of these 8 participants, 6 participants had a

SBP of 7 % or more from baseline, while no participants had a DBP of 7% lower than baseline. Table C displays the pre SBP for all 22 participants, but only 8 participants have post DBP. 2 participants have asterisk next to their name because they were drop from the study due to insurance purposes.

Table C:

	Pre SBP (mmHg)	Pre DBP (mmHg)	Post SBP (mmHg)	Post DBP (mmHg)	Average B/P	Age (years)	Gender
101.	140	85			132/83	54	F
202.	146	87	115	95	131/91	64	M
303.	145	73	110	84	128/79	60	F
404.	158	110			139/95	45	M
505.	*					56	F
606.	137	94			131/94	39	F
707.	154	98	132	95	143/96	60	M
808.	130	88			119/92	46	F
909.	133	101	132	95	133/98	38	M
1010.	126	89			126/87	52	M
1011.	143	78			129/70	66	F
1012.	133	88			137/88	50	F
1013.	150	93	131	75	141/84	64	F
1014.	*					37	F
1015.	138	83			130/78	56	F
1016.	126	90			118/85	51	F
1017.	154	80			154/85	46	F
1018.	207	105			170/102	54	F
1019.	120	91	128	82	124/87	59	F
1020.	157	84	153	83	155/84	60	M
1021.	186	110				61	M
1022.	138	84	126	82	132/83	61	F

Abbreviations: SBP, systolic blood pressure; DBP, diastolic blood pressure; F, female; M, male.

A paired Sample T Test, also known as a Dependent T Test, was used in order to analyze the results. As can be seen in table 1, there were statistically significant improvements in BP from pretest to posttest on average with the Mean Arterial Pleasure (MAP) and Systolic BP. The MAP decrease from an average of 105.7 to 100.4 [t(7)=2.32, p=.027, Cohen's D=1.76] whereas

the SBP decrease from an average of 142.9 to 128.4 [t(7)=2.74, p=.015, Cohen's D=2.07]. There was a small but nonsignificant decrease in DBP decrease from an average of 87.1 to 86.4 [t(7)=0.17, p=.868, Cohen's D=0.129]. It should be noted that both the MAP and SBP had large effect sizes while a small effect was seen for DBP.

Table 1:

	Pre		Post				
	M	*SD*	*M*	*SD*	*t(7)*	*p*	*Cohen' D*
MAP	105.7	7.44	100.4	6.11	2.32	.027	1.76
SBP	142.9	12.15	128.4	12.88	2.74	.015	2.07
DBP	87.1	10.55	86.4	7.63	0.17	.868	0.129

Key Facilitators of Project Success

The success of this project has to be credited to two individuals. First, and foremost, Dr. Hain, the project chair, was very supportive throughout the process of this project. Her endless guidance helped steer this project in the right direction. Also, Dr. Nakeisha Kinlaw-Williams, the community team member, was the backbone of this project. Her countless hours of collaboration and willingness to put me in contact with a vendor that donated equipment free of cost and was very much appreciated. I would also like to thank Christine Barbato, APRN. She was very helpful throughout the implementation phase of the project. Lastly, I would like to

thank Laura Frobrose, the manager at the community health center, for granting permission and space for this project to take place at the community health center.

Barriers/ Challenges

Several barriers were identified in the development and implementation of this quality improvement project. First, time was a big factor due to receiving approval from the FAU DNP committee later than expected. As a result, the project leader had less time to recruit and implement her project. Luckily, the project leader was able to work closely with Dr. Kinlaw-Williams to recruit participants currently enrolled in the chronic disease program that met criteria.

Another concern was getting participants to continually check their blood pressure throughout the course of the QI project. Although all participants received education on importance of checking blood pressure and continuation of self-care behaviors, 63 % of participants stopped checking their blood pressure at some point during the project. A few causes that participants reported included working more to make ends meats and life stressors. Therefore, the project leader educated these individuals to continue diet, exercise and medication adherence. Ultimately, having only 8 participants continue with the blood pressure and self-care intervention for 2 months restricted the projects ability to show that it had a positive impact or statistical significance.

Another challenge was getting students/staff to administer the HTN knowledge and self-care scale pre -test while recruiting patients when the project leader was not present. Therefore, the project leader set up folders with educational information about the program along with the

pre / post-test survey inserted in the folder. Additional instructional education was provided to students and staff to administer the pre-test to participants.

Another challenge encountered during the QI project was the need to increase participant-friendliness of the two survey tools. A few questions could have been worded differently. During the final data collection phase, surveys were completed via telephone and some participants asked the project leader for clarification.

Lastly, 10% of the participants had to drop out of the QI project due to the fact that they now qualified for insurance. The community health center is a non -profit organization. Therefore, they can't accept individuals with insurance or they can lose funding. As a result, participants who had insurance were released from the program.

Unintended consequences

Overall, this quality improvement project supported the participants to be more knowledgeable about HTN and self-care behaviors, while taking positive strides to be active participants in their health. The participants found HTN to be a manageable chronic disease after receiving intervention. In addition, lifestyle changes occurred due to this quality improvement project as evidenced by a reduction in pre to post blood pressure. In turn, providers at the health center were able to provide care to patients who were more knowledgeable about HTN and related self- care behaviors, which can decrease or reduce the onset of long-term complications.

During the course of the QI project, the project leader did realize that many of the participants were diabetic or overweight in addition to having HTN. But, this project failed to

access how self-care behaviors such as diet and exercise can also result in weight loss and reduction of A1C simply because it was not an area of study for this QI project.

Project evaluation

The original project sought to determine the effectiveness of a protocol for blood pressure follow-up monitoring in the primary care setting on adults with HTN with the goal of improving blood pressure control through self-care behaviors over a four-month timeframe. The intervention at the time was to recruit 20 to 40 participants between the ages of 21 – 85 with a diagnosis of HTN within the year. Patient recruitment on the higher end would be very overwhelming due to the time constraint. In addition, it was very difficult to find participants that were diagnosed with HTN within the last year. Thankfully, the project leader was able to recruit patients enrolled in the chronic disease program and patients who were diagnosed within the last year, with guidance from her community leader Dr. Kinlaw-Williams DNP, APRN, AGNP-BC.

Originally, participants were scheduled to receive monthly phone calls to follow up on blood pressure logs, taking medication and engagement in self- care behaviors. Shortly after starting the project, modifications had to be made to do weekly phone calls due to time restraints and in order to increase compliance.

Summative

The results of the analysis showed that the project succeeded in achieving the goal of improving blood pressure control through self-care behaviors. There were statistically significant improvements in BP from pretest to posttest on the average the Mean Arterial Pleasure (MAP) and Systolic BP. There was a small but nonsignificant decrease in DBP

decrease from an average of 87.1 to 86.4. A reason for this could be due to the fact that the average DBP was not far from the normal range of DBP below 80. Therefore, there was less room for improvement compared to the average SBP.

Although, the intent of this DNP project, was not focused on time as a variable, it would be of benefit to extend the timeframe used to compare pre-intervention and post intervention blood pressure and survey scores. This would be helpful during the dissemination process as it would strengthen the validity of findings and represent success of the goals of the project. Therefore, conducting the QI project over a year may yield results that support the continuation of this project in the clinical setting.

Recommendations

The most notable site specific recommendation would be to have a designated staff member available to conduct weekly phone calls to participants to provide education on medication adherence, self-care behaviors and answer any questions that come up on the program or how to use the blood pressure machine. It would also be useful to have a designated staff member available to upload weekly blood pressures while school is not in session. Additionally, in order to provide continuity of care and improve health outcomes, it would be great if participants that obtained insurance somehow could continue the RPM program or be referred to a similar community resource.

Lastly, I found that a few participants were very excited to use the IHealth wireless blood pressure machine but some of the participants forgot how to use the machine shortly after going home. Although, a return demonstration was provided during the initial counseling session along with instruction sheet placed in their folder. A follow up phone call was done within 48

hours after being enrolled in the program but it was difficult to provide technical support over the phone. Some participants had device issues that could not be resolved over the phone. Therefore, participants had to schedule an appointment to come to the clinic to get help in person. So, another site recommendation would be to have a more patient friendly process for help with devices.

Lastly, there is a need to collaborate with a research doctoral prepared nurse to discover the gap in evidence and need for research. This QI project could be implemented in other primary care settings. Although, the number of participants in this quality improvement project were low, the findings showed great possibilities to address the complex issue of supporting participants to achieve established goals. Overall, the two-month post intervention survey responses were also positive; participants who completed the project expressed satisfaction with the process.

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Appendix A

COMMUNITY
HEALTH CENTER
OF WEST PALM BEACH
Sharing the Love of God Through Healthcare

March 2, 2021

Agency: Community Health Center of West Palm Beach
Contact Person: Laura Frobose
Address: 2100 W 45th Street A 8/9 West Palm Beach Fl, 34972

Dr. Susan Bulfin,
DNP Program Director
Christine E. Lynn College of Nursing
777 Glades Road
Boca Raton, Fl 33431

Dear Dr. Bulfin,

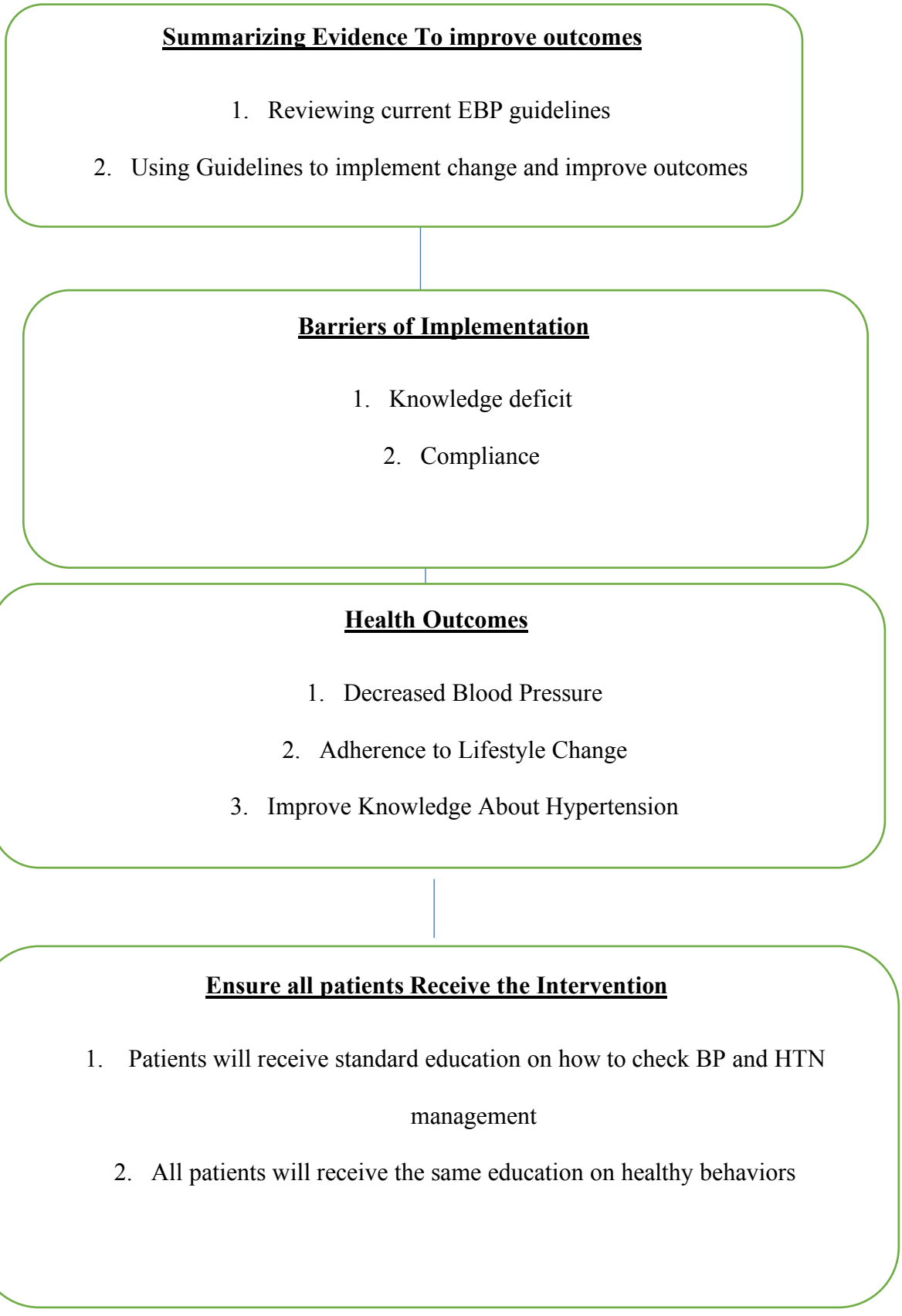
This letter is to confirm that we grant, Jasmine Wilcox, Doctor of Nursing Practice student, approval to complete her DNP Project at the Community Health Center of West Palm Beach. The project entitled "The Impact of a Blood Pressure Monitoring Wellness Program on Adults with Hypertension" is based on the clinical question, "Does an evidence-based blood pressure monitoring wellness program (I) in adults with Hypertension (P) improve blood pressure control (O) over a four-month period?"

Signature of Agency Representative

Laura Frobose

Appendix C

Translational Change Theory



Appendix D

Blood Pressure Knowledge Scale (Revised)

How likely do you believe that the statements below are true? Using the scale below, choose the number that best matches your answer.

		Strongly Disagree						**Strongly Agree**
1	Eating a low-fat diet will help keep my blood pressure within a normal range	1	2	3	4	5	6	7
2	Eating a low salt diet will help keep my blood pressure within a normal range	1	2	3	4	5	6	7
3	Eating a diet with at least five fruits and vegetables each day will help keep my blood pressure within a normal range	1	2	3	4	5	6	7
4	Physical activity for at least 30 minutes each day will help keep my blood pressure within a normal range	1	2	3	4	5	6	7
5	Seeing my doctor on a regular basis will help my blood pressure within a normal range	1	2	3	4	5	6	7
6	The best way for somebody with high blood pressure to keep their blood pressure within a normal range is by taking their medications as ordered by the doctor	1	2	3	4	5	6	7
7	Avoiding alcohol (such as beer, wine, liquor) will help keep my blood pressure in a normal range	1	2	3	4	5	6	7
8	Reducing stress will keep my blood pressure in a normal range	1	2	3	4	5	6	7
9	Maintaining a normal weight will help keep my blood pressure in a normal range	1	2	3	4	5	6	7
10	Avoiding tobacco (such as smoking or chewing) would help keep my blood pressure in a normal range	1	2	3	4	5	6	7
11	I know when my blood pressure is high (above normal) based off how I feel	1	2	3	4	5	6	7

R.M. Peters

Blood Pressure Self-Care Scale (revised)

How often are the following statements true about you? Using the scale below, choose the number that best matches your answer.

			Never 1	2	3	4	5	6	Always 7
1	I am eating a low-fat diet each day		1	2	3	4	5	6	7
2	I eat a low salt diet each day		1	2	3	4	5	6	7
3	I eat a diet with at least five fruits and vegetables each day		1	2	3	4	5	6	7
4	I exercise at least 30 minutes each day		1	2	3	4	5	6	7
5	I am able to maintain a low level of stress each day		1	2	3	4	5	6	7
6	I maintain a healthy weight		1	2	3	4	5	6	7
7	I drink two or more alcoholic beverages each day		1	2	3	4	5	6	7
8	I use tobacco		1	2	3	4	5	6	7
9	I see my doctor as he/ tells me to.		1	2	3	4	5	6	7
10	I take my blood pressure pills exactly as advised by my doctor each day	N/A	1	2	3	4	5	6	7

R.M. Peters

American Heart Association.

My Blood Pressure Log

Name: _____

My Blood Pressure Goal: _____ mm Hg

Instructions:

- Measure your blood pressure twice a day—morning and late afternoon—at about the same times every day.
- For best results, sit comfortably with both feet on the floor for at least two minutes before taking a measurement.
- When you measure your blood pressure, rest your arm on a table so the blood pressure cuff is at about the same height as your heart.
- Record your blood pressure on this sheet and show it to your doctor at every visit.

DATE	AM	PM

DATE	AM	PM