Journal of the American Pharmacists Association 62 (2022) S41–S46

Contents lists available at ScienceDirect

Journal of the American Pharmacists Association

journal homepage: www.japha.org

ADVANCES IN PHARMACY PRACTICE

Implementation of a self-measured blood pressure program in a community pharmacy: A pilot study

Heather Jarvis, Sarah Oprinovich*, Kendall Guthrie

ARTICLE INFO

Article history:
Received 30 August 2021
Accepted 30 October 2021
Available online 3 November 2021

ABSTRACT

Background: Hypertension is a leading cause of cardiovascular disease in the United States and is costing the health care system billions of dollars annually. A health program that combines education, empowerment, and monitoring has shown to improve clinical outcomes and decrease overall health care costs.

Objective: To describe the implementation and effectiveness of a self-measured blood pressure (SMBP) program in a community pharmacy.

Practice description: An independent community pharmacy located within rural Southeast Missouri. On-site community pharmacists provide medication therapy management, adherence monitoring, immunizations, and reimbursed clinical services.

Practice innovation: Patients were eligible if they were older than 18 years of age and fell into one of the following categories: self-reported a new hypertension diagnosis, self-reported a desire to SMBP, were referred by a provider, or had a medication change within the 3 months before enrollment. The program consisted of 4 patient sessions. The first session obtained an initial blood pressure and provided patient education and behavior counseling. Follow-up sessions obtained average SMBP readings and reinforced previously learned concepts.

Evaluation methods: Implementation was evaluated using time and patient satisfaction. Effectiveness was evaluated using number and type of clinical problems identified, BP measurements, and test scores.

Results: A total of 20 patients enrolled and completed the study. The program took 63 minutes (SD ± 18) of staff time per patient for recruitment, sessions, reminder calls, and documentation. All patients received education and monitoring and 11 additional clinical problems were documented. Systolic BP decreased an average of 17 mm Hg ($P = 0.002$), and diastolic BP decreased an average of 12 mm Hg ($P < 0.001$). Patient confidence scores increased by 14%, and 7 more patients correctly answered the post-test knowledge question. All patients reported overall satisfaction with the program as "satisfied" or "very satisfied."

Conclusion: This standardized SMBP program effectively improved hypertension control and patient confidence in managing BP.

Background

According to the Centers for Disease Control and Prevention (CDC), an estimated 75 million Americans have hypertension; of those, approximately half do not have their blood pressure (BP) under control.[1,2] Uncontrolled hypertension is a leading contributor to cardiovascular disease that causes considerable morbidity, mortality, and rising health care costs in the United States.[3,4] Between 2005 and 2015, the rate of deaths associated with hypertension increased by 10.5%, and the actual number of deaths increased by 37.5%.[3] In addition, hypertension is estimated to cost the U.S. health care system $131 billion annually, averaging an extra $2000 per

Disclosure: The authors declare no relevant conflicts of interest or financial relationships.

Funding: An American Pharmacists Association Foundation Incentive Grant was awarded by the APhA Foundation and Community Pharmacy Foundation (2021648) to support this project. Reimbursement for services was earned through a Health Resources and Services Administration grant (D60RH25760).

Previous presentations: Virtual Midwest Pharmacy Residency Conference, May 13, 2021. Virtual Pharmacy Quality Alliance Annual Meeting, May17, 2021. Virtual American Pharmacists Association Annual Meeting, March 12, 2021.

* **Correspondence:** Sarah Oprinovich, PharmD, BCACP, University of Missouri-Kansas City School of Pharmacy, 2464 Charlotte St., Kansas City, MO, 64108.

E-mail address: oprinovichs@umkc.edu (S. Oprinovich).

https://doi.org/10.1016/j.japh.2021.10.032
1544-3191/

Key Points

Background:

- Hypertension is a leading cause of cardiovascular disease.
- Cardiovascular disease is costing the health care system billions of dollars annually.
- Health programs that combine education, empowerment, and self-measurement have proven to improve clinical outcomes and decrease overall health care costs.

Findings:

- A description of program components that can help pharmacies implement a self-measured blood pressure (SMBP) program at their community practice site.
- Support that an SMBP program implemented in a community pharmacy setting can improve clinical outcomes.

hypertensive patient per year.[3,5] By the year 2035, total annual costs for cardiovascular disease are expected to exceed one trillion dollars.[3] To address the burden of uncontrolled hypertension on the health care system, the American Heart Association and the American Medical Association created a national initiative called Target:BP.[6] Target:BP provides a number of resources and tools to assist clinicians in developing patient programs focused on lowering BP, with a particular emphasis placed on self-measured BP (SMBP).[6]

According to the CDC, "Self-measured blood pressure involves a patient's regular use of personal blood pressure monitoring devices to assess and record blood pressure across different points in time outside of a clinical, community, or public setting, typically at home."[7] SMBP is recommended over in-office (provider-collected) BP because of its accuracy.[2,7,8] Provider-collected BPs represent one moment in time and may not reflect a patient's typical BP. Patients can have falsely elevated BP in a health care setting but be normotensive out of the health care setting (white coat hypertension), or the opposite may be true (masked hypertension).[7] Averaging multiple BP readings at different times of the day, over several weeks, will better reflect a patient's typical BP, identify unusual variations, and help rule out white-coat or masked hypertension. These additional BP readings may also assist in optimizing patient therapy. For example, masked hypertensive patients who self-screen are more likely to be diagnosed as having hypertension earlier and begin medication therapy earlier than masked hypertensive patients who do not self-screen. Masked hypertensive patients who do not self-screen may not be aware that they have high BP until they end up in an expensive emergency situation. For these patients in particular, engagement by medical professionals or staff is necessary.

Medical professionals, including pharmacists, can engage patients through the implementation of SMBP programs. Owing to enhanced accuracy and efficacy, substantial emphasis is being placed on SMBP nationally to help lower BPs and prevent unnecessary health care costs.[2,3,5-8] Community pharmacies may be ideal locations to support SMBP initiatives. In 2013, North Carolina Medicaid released claims data showing that high-risk patients visited their pharmacies 35 times per year compared with the 3.5 times they visited their primary care physician.[9] Furthermore, a 2020 study reported that in a cohort of more than 680,000 Medicare beneficiaries, patients visited their pharmacies an average of 13 times per year compared with 7 visits per year with their physician.[10] These data demonstrate that community pharmacies are in a unique and convenient position to provide sustained, longitudinal contact with patients that may support clinical services. This is especially important in medically underserved areas, such as Southeast Missouri, where a lack of transportation or other social determinants of health may further limit provider access.[11,12]

We hypothesized that developing a standardized and streamlined process for implementing an SMBP program could assist other community pharmacies considering implementing this service. Standardization could facilitate consistent quality patient care and improve patient safety by minimizing errors of omission in education.[13] In addition, although not all pharmacies have the resources to create clinical programs, implementing an already developed program may increase efficiency and provide support and justification for implementation.

Objectives

This study sought to describe the implementation and effectiveness of an SMBP program in a rural community pharmacy.

Practice description

L and S Pharmacy is an independent community pharmacy located in rural Southeast Missouri, in a medically underserved area,[12] providing a range of patient care and community services. At the time of this study, the pharmacy dispensed approximately 1000 prescriptions per week and employed 1 full-time pharmacist, 1 part-time pharmacist, a postgraduate year one community-based pharmacy resident, and 4 technicians cross-trained as community health workers. The practice setting also served as a training site for several advanced practice pharmacy students throughout the year. The resident pharmacist was responsible for program development, implementation, data tracking, and documentation.

Practice innovation

This prospective pilot study was approved by the University of Missouri-Kansas City Institutional Review Board (#271949). The SMBP program was created in collaboration with the Mississippi County Health Department and Community Pharmacy Enhanced Services Network–Missouri as part of a 3-year Health Resources and Services Administration grant.

Recruitment

All patients who enrolled and completed the SMBP pilot program between December 7, 2020, and April 30, 2021, were included in the study. The SMBP program was available to all L and S Pharmacy patients who chose to participate, were older than the age of 18 years, managed their own medications, and fell into one of the following categories: self-reported a new diagnosis of hypertension, self-reported a desire to SMBP, were referred by a health care provider, or had undergone an antihypertensive regimen change within the 3 months before enrollment. All pharmacy staff assisted with patient recruitment.

Program structure

The program's general structure outlined in Figure 1 included an initial session, 2 follow-up sessions, and a final session conducted over a 5-week period in a week-on, week-off format. If a patient was unable to adhere to this specific program structure, accommodations were made to allow the patient to finish the program. Before patient enrollment, folders were prepared containing program information and hypertension education. Program information included consent and documentation forms and patient logs. Hypertension education materials included information on diet, exercise, SMBP technique, and medication adherence. BP monitors, both pharmacy and patient supplied, were calibrated using the "SMBP Device Accuracy Test" form found on the Target:BP website.[6] Initial sessions were conducted on a walk-in basis or were scheduled using an electronic scheduling system. One day per week was set aside for follow-up sessions. Reminder calls were made the day before starting an SMBP week to keep patients on schedule.

During the initial sessions, a pharmacist consented patients, administered a pre-test, and obtained a starting BP. General hypertension education and program instructions were provided. Patients were instructed to SMBP, twice in the morning and twice in the evening, 1 minute apart, for 1 week and record their results using a paper log. Patients were also encouraged to set a behavioral goal to maintain engagement. The first SMBP week started the day after the initial session. Each follow-up session was conducted the day after completion of an SMBP week or as soon as the patient was available. During the follow-up and final sessions, SMBP measurements were averaged and assessed, and the pharmacist resolved clinical problems if needed. A post-test and satisfaction survey were also administered during the final session.

Documentation

SMBP measurements and session notes were documented in the pharmacy's software system in the form of Pharmacist eCare Plans (PeCP) using standardized Systemized Nomenclature of Medicine (SNOMED) codes. PeCP uses an interoperable standard to consistently document care using the Pharmacists' Patient Care Process across multiple electronic platforms.[14] The following SNOMED codes were used during the initial session: 3915509 (hypertension education), 46973005 (BP taking), and 50723001 (BP taking education). For follow-up sessions, the SNOMED code 135840009 (BP monitoring) was used.

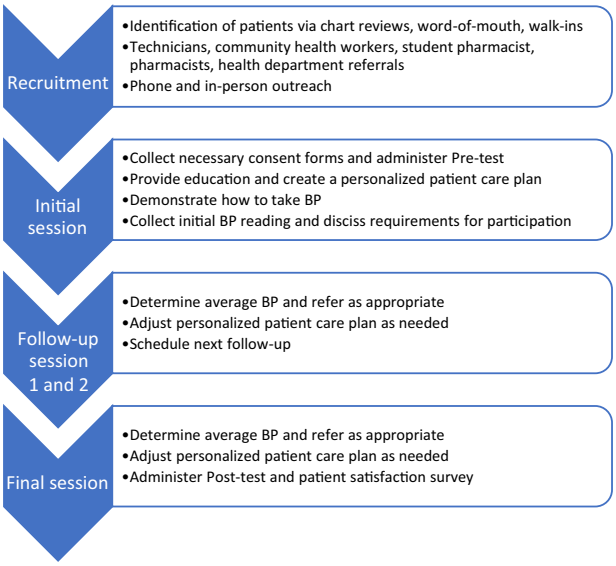

Figure 1. General program structure. Abbreviation used: BP, blood pressure.

Evaluation methods

The primary outcome measures for this pilot study that evaluated implementation included (1) staff time to complete session components and (2) patient satisfaction with the program. The outcome measures that evaluated effectiveness included (1) number and type of clinical problems identified, (2) change in average systolic and diastolic BPs, and (3) change in pre-/post-test scores.

Time was recorded for all session components using a stopwatch and rounded up to the next whole minute. Session components included recruitment, sessions, reminders, and documentation. Time spent during missed outreach attempts was incorporated into the total time for the prospective program component. Alternatively, if patients dropped off their data logs, the session time was recorded as 5 minutes; this included the time it took to calculate an SMBP average and document using a PeCP. If those patients required a follow-up phone call, the time spent was added to the 5-minute session time. The pharmacist assessed BPs at each session and referred, if appropriate, to a health care provider or facility following the Eighth Joint National Committee guidelines.[15] Identified clinical problems and session notes were documented using PeCP. The pre- and post-test in Appendix 1 had a total of 6 questions. Five questions were confidence based using a numbered Likert scale, worth 1-5 points, and 1 question was knowledge based, worth 1 point if answered correctly. The patient satisfaction survey had a total of 7 questions. Five questions used a Likert scale with answer choices that ranged from "Strongly Agree" to "Strongly Disagree," and 2 questions were open ended asking patients what they liked or disliked about the service.

Changes in average BPs and pre- and post-test confidence scores were compared using paired *t* tests. The change in the percentage of patients meeting the Healthcare Effectiveness Data and Information Set (HEDIS) BP goal of <140/90 mm Hg was determined using a chi-square test.[16] The percentage of patients correctly answering the knowledge-based question

on the pre- and post-test was determined using a chi-square test. Time and satisfaction results were analyzed and reported using descriptive statistics.

Results

Twenty patients enrolled and completed the study. Demographics can be summarized as follows: 40% Black, 60% white, 30% gender-identified men, 70% gender-identified women, and 70% younger than 65 years of age.

Time

The total time spent implementing the SMBP program, including documentation time, averaged 63.25 minutes (SD ± 18.38) per patient and ranged from 35 to 101 minutes (Table 1). The initial session took the greatest amount of time, averaging 25.5 minutes per patient (SD ± 7.02), and ranged from 14 to 37 minutes. Recruitment and reminder calls to start an SMBP week were combined into "other" time that averaged 3.55 minutes (SD ± 3.99) per patient and ranged from 0 to 14 minutes.

Clinical problems

All enrolled patients needed education and monitoring. Eleven additional clinical problems were documented: 5 medication adjustments, 4 referrals to a health care provider or facility, 1 restart of an abandoned medication, and 1 prescriber-confirmed white-coat hypertension. Medication adjustments ranged from increasing the strength of 1 medication to completely changing a patient's medication regimen. One health care referral resulted in a treatment-naïve patient beginning medication therapy. Another patient, after self-screening, noticed his systolic BP raise to >180 mm Hg and immediately took himself to the emergency department; he arrived at the pharmacy the next day with new prescriptions.

BP

The average systolic BP decreased from 152.45 mm Hg (SD ± 22.46) at the initial session to 135.45 mm Hg (SD ± 9.89) at the final session ($P = 0.002$) (Figure 2). The average diastolic BP decreased from 88.55 mm Hg (SD±13.76) at the initial session to 76.35 mm Hg (SD ± 6.45) at the final session ($P < 0.001$). The percentage of patients with controlled BP per the HEDIS measure increased from 25% at the initial session to 75% at the final session ($P = 0.002$).

Table 1
Summary of time results (N = 20)

Event	Mean time (min)	Range (min)
Initial session	25.5 (SD ± 7.02)	14–37
Follow-up 1	7.95 (SD ± 4.63)	5–19
Follow-up 2	11.6 (SD ± 6.71)	5–27
Final session	14.65 (SD ± 5.24)	5–24
Other[a]	3.55 (SD ± 3.99)	0–14
Total	63.25 (SD ± 18.38)	35–101

[a] Includes recruitment and reminder calls.

Pre- and post-test scores

The score for confidence-based questions averaged 20.3 of 25 points (SD ± 4.51) at the initial session and 23.9 of 25 points (SD ± 1.48) at the final session ($P < 0.001$). At the initial session, 55% of patients were able to correctly answer the knowledge-based question versus 90% at the end of the program ($P = 0.013$).

Satisfaction

All patients selected "Agree" or "Strongly Agree" for Likert-type questions on the satisfaction survey. All patients rated their overall experience with the SMBP program as "Satisfied" or "Very Satisfied." Refer to Table 2 for patient comments to open-ended questions. All patients reported they would recommend this program to others struggling with high BP.

Practice implications

This study described the implementation of a standardized SMBP program in a community pharmacy setting, a health care setting not previously explored. The results of this study may help pharmacies decide if they have the necessary resources to implement such a program at their facility. SMBP is a useful tool to help reduce the burden of uncontrolled hypertension by providing patient accountability, education, and support. Implementing a standardized SMBP program may help to reduce costs, improve efficiency in pharmacy workflow, and prevent gaps in information provided to patients.

Before implementing an SMBP program, pharmacies need to consider payment for service. This pilot project provides a preliminary benchmark for time on which to base a fee for service. The labor cost to perform this intervention (over approximately 5 weeks) using the national average pharmacist salary per hour ($60.32[17]) is $63.59 per patient. If using the Southeast Missouri nonmetropolitan area average ($63.80[17]), the labor cost would amount to $67.25 per patient. Jacob et al.,[18] in a similar study, found the median cost of SMBP, with additional support, to be $174 per person per year. This amount of reimbursement to pharmacies is justifiable when considering potential cost savings, essentially covering the entire cost of the program.[7] In addition, the longer hypertensive patients use their BP monitors, the larger the return on investment.[7] When considering time/salary and the cost of BP monitoring devices, an amount of $174 (for 5 weeks of service) is a reasonable request for fee for service, if not undervaluing the SMBP program, given that some patients will require monitoring past 5 weeks. It may be prudent to also determine a price structure beyond 5 weeks and for extended follow-ups, for patients who take longer to meet their BP goals or who need additional monitoring and support. Partnering with third party payers, grant programs, and employers could provide the necessary funding for program initiation and maintenance.

The BP lowering seen in this pilot program is consistent with other studies measuring the effect of SMBP, specifically pharmacist-provided telemonitoring services.[19-26] BP control in our patient population improved, but further research is needed to evaluate program effectiveness on a larger scale. In addition, patients completed the program feeling confident they had the ability to improve their BP through behavioral

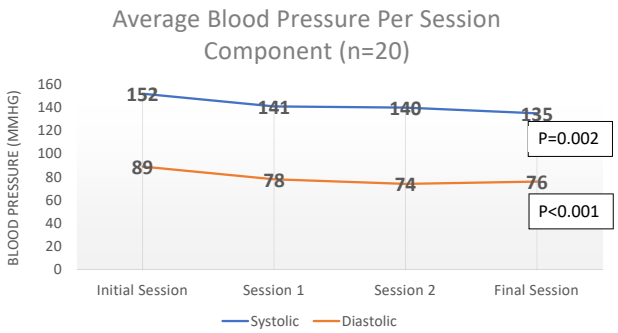

Figure 2. Summary of BP results (n = 20). Abbreviation used: BP, blood pressure. *Systolic BP ($P = 0.002$). **Diastolic BP ($P < 0.001$).

modifications and medication adherence. Longitudinal studies checking in with these patients 6 months or a year down the line would determine whether this program has a sustained effect on participating patients.

Time

Several outliers resulted in longer time spent on program components. For example, 1 recruitment cold call took more than 10 minutes, and 1 initial session was conducted via a home visit and required additional setup time. Several patients had an initial BP reading that was severely elevated and required a second BP be taken. In addition, time may be a major consideration for pharmacies that only have a single pharmacist staffing at any given time. For example, it may be difficult for a sole dispensing pharmacist to step away for an entire initial session. Although this was not an issue for this pilot project, it may be an issue at other locations. Strategies that can help reduce time associated with implementation could include scheduling initial sessions during less busy times or having technicians help with collecting patient information and filling out paperwork, delegating reminder calls and follow-up sessions to community health workers or advanced pharmacy technicians, scheduling set call back times, and allowing patients to drop off their data logs at their convenience, which would not require coordination. Of note, administration time for creating this service was not factored into this study's time.

Challenges to implementation

Challenges to implementation include (1) staff familiarity with the new program process, (2) a limited number of BP monitoring devices, (3) follow-up scheduling, and (4) the coronavirus disease 2019 (COVID-19) pandemic. New programs are often a challenge to start because staff are unfamiliar with how the new process fits into current workflow. Time needs to be spent training staff and familiarizing them with program components to avoid delays in service implementation. We also took advantage of point-of-sale opportunities and used staff during routine pharmacy tasks to assist with efficiently recruiting patients. A second challenge to implementation is having enough BP monitoring devices for patients to use. BP monitors are an added expense and a finite resource that may be difficult for a pharmacy to afford and may limit the number of patients that can be participating in the program at any one time. We were able to overcome this barrier through grant funding and the utilization of patient-owned BP monitoring devices. A third challenge to implementation was scheduling follow-up appointments. When we had more than 5 patients enrolled in the program at once, flexibility in scheduling became cumbersome. We responded by establishing set days of the week to schedule follow-ups and combined reminder calls with follow-ups when able. Finally, this program was implemented during the COVID-19 pandemic. This added an extra challenge given that several patients had to delay enrollment or follow-up sessions because they were quarantining.

Limitations

The limitations of this study included potential selection and volunteer biases, a small sample size, and patients self-reported their BPs during follow-up sessions. It was possible that errors could have been made when taking and reporting BPs. In addition, most patients who enrolled in the study were looking for a BP monitor or were part of an existing adherence program and were familiar with pharmacy outreach and may have been more motivated to complete program components. A larger sample size may also show different clinical and statistical results.

Next steps

This project served as a pilot site for a 22-location rollout in the Southeast Missouri area that includes 11 county health departments and, at minimum, 11 pharmacies within those counties, over a 3-year period. At the end of this project, training was underway for several health departments and pharmacies using the process outlined earlier. Future research could include analyzing data gathered from all participating locations to determine whether the program was successful across multiple sites.

Table 2
Satisfaction survey comments

What did you like about the program?	"The monitoring of my blood pressure in the morning and at night helped me to gain insight into the different factors that can contribute to an increase/decrease in blood pressure."
	"I liked that I had to keep an eye on my blood pressure every day."
	My pharmacist "was very helpful and encouraging."
	"The service was great, very friendly staff."
	"This program helped me to lower my blood pressure."
	"It was very informational. I learned the correct way to read my blood pressure machine and about the correct readings."
	"Learned something new about my health."
	This program "kept me on my toes."

Conclusion

This standardized SMBP program effectively improved hypertension control and patient confidence in managing BP. In addition, patients reported they were satisfied with their overall experience and would recommend this service to others.

Acknowledgments

The authors acknowledge staff at the Mississippi County Health Department in Charleston, Missouri, for their collaboration in developing program materials (including the pre-/post-test) and for Community Pharmacy Enhanced Services Network–Missouri's support in implementing this program. Dominique Devereux, PharmD, from the University of Missouri-Kansas City School of Pharmacy is also acknowledged.

References

1. Merai R, Siegel C, Rakotz M, et al. CDC grand rounds: a public health approach to detect and control hypertension. *MMWR Morb Mortal Wkly Rep*. 2016;65(45):1261–1264.
2. Centers for Disease Control and Prevention. Millionhearts® 2022. Available at: https://millionhearts.hhs.gov/. Accessed August 9, 2021.
3. Benjamin EJ, Virani SS, Callaway CW, et al. Heart disease and stroke statistics-2018 update: a report from the American Heart Association [published correction appears in Circulation. 2018;137(12):e493]. *Circulation*. 2018;137(12):e67–e492.
4. Mozaffarian D, Benjamin EJ, Go AS, et al. Heart disease and stroke statistics–2015 update: a report from the American Heart Association [published correction appears in Circulation. 2015;131(24):e535] [published correction appears in *Circulation*. 2016;133(8):e417]. *Circulation*. 2015;131(4):e29–e322.
5. Kirkland EB, Heincelman M, Bishu KG, et al. Trends in healthcare expenditures among US adults with hypertension: national estimates, 2003–2014. *J Am Heart Assoc*. 2018;7(11):e008731.
6. American Heart Association and American Medical Association. Target: BP Tools and Downloads. Available at: https://targetbp.org/tools-downloads/?sort=topic&. Accessed August 9, 2021.
7. Centers for Disease Control and Prevention. Self-measured blood pressure monitoring with clinical support. Available at: https://www.cdc.gov/dhdsp/pubs/guides/best-practices/smbp.htm#:~:text=Self%2Dmeasured%20blood%20pressure%20monitoring%20(SMBP)%20involves%20a%20patient's,public%20setting%2C%20typically%20at%20home. Accessed August 9, 2021.
8. Shimbo D, Artinian NT, Basile JN, et al. Self-measured blood pressure monitoring at home: a joint policy statement from the American Heart Association and American Medical Association. *Circulation*. 2020;142(4):e42–e63.
9. Integrating pharmacists into the medical home team. Community care of North Carolina. Available at: https://www.community.carenc.org/what-we-do/supporting-primary-care/pharmacy/cpesn. Accessed August 10, 2021.
10. Berenbrok LA, Gabriel N, Coley KC, Hernandez I. Evaluation of frequency of encounters with primary care physicians vs visits to community pharmacies among Medicare beneficiaries. *JAMA Netw Open*. 2020;3(7):e209132.
11. Office of Disease Prevention and Health Promotion. Social determinants of health. Available at: https://www.healthypeople.gov/2020/topics-objectives/topic/social-determinants-of-health. Accessed August 10, 2021.
12. Health Resources and Services Administration. MUA find. Available at: https://data.hrsa.gov/tools/shortage-area/mua-find. Accessed August 10, 2021.
13. Rodziewicz TL, Houseman B, Hipskind JE. *Medical Error Reduction and Prevention*. Treasure Island, FL: Pearls Publishing; 2021.
14. Pharmacist eCare Plan Initiative. What is the pharmacist electronic care plan?. Available at: https://www.ecareplaninitiative.com/. Accessed August 10, 2021.
15. James PA, Oparil S, Carter BL, et al. 2014 Evidence-based guideline for the management of high blood pressure in adults: report from the panel members appointed to the eighth Joint National Committee (JNC 8) [published correction appears in JAMA. 2014;311(17):1809]. *JAMA*. 2014;311(5):507–520.
16. National Committee on Quality Assurance. HEDIS and performance measurement. Available at: https://www.ncqa.org/hedis/. Accessed August 10, 2021.
17. U.S. Bureau of Labor Statistics. Occupational employment and wage, May 2020: 29-1051 Pharmacists. Available at: https://www.bls.gov/oes/current/oes291051.htm#st. Accessed August 10, 2021.
18. Jacob V, Chattopadhyay SK, Proia KK, et al. Economics of self-measured blood pressure monitoring: a community guide systematic review. *Am J Prev Med*. 2017;53(3):e105–e113.
19. McManus RJ, Little P, Stuart B, et al. Home and online management and evaluation of blood pressure (HOME BP) using a digital intervention in poorly controlled hypertension: randomised controlled trial. *BMJ*. 2021;372:m4858.
20. McKinstry B, Hanley J, Wild S, et al. Telemonitoring based service redesign for the management of uncontrolled hypertension: multicenter randomized controlled trial. *BMJ*. 2013;346:f3030.
21. Tucker KL, Sheppard JP, Stevens R, et al. Self-monitoring of blood pressure in hypertension: a systematic review and individual patient data meta-analysis. *PLoS Med*. 2017;14(9):e1002389.
22. Bray EP, Holder R, Mant J, McManus RJ. Does self-monitoring reduce blood pressure? Meta-analysis with meta-regression of randomized controlled trials. *Ann Med*. 2010;42(5):371–386.
23. Beran MS, Asche SE, Bergdall, et al. Key components of success in a randomized trial of blood pressure telemonitoring with medication therapy management pharmacists. *J Am Pharm Assoc (2003)*. 2018;58(6):614–621.
24. Margolis KL, Asche SE, Bergdall AR, et al. Effect of home blood pressure telemonitoring and pharmacist management on blood pressure control: a cluster randomized clinical trial. *JAMA*. 2013;310(1):46–56.
25. Green BB, Cook AJ, Ralston JD, et al. Effectiveness of home blood pressure monitoring, web communication, and pharmacist care on hypertension control: a randomized controlled trial [published correction appears in JAMA. 2009;302(18):1972]. *JAMA*. 2008;299(24):2857–2867.
26. Monahan M, Jowett S, Nickless A, et al. Cost-effectiveness of telemonitoring and self-monitoring of blood pressure for antihypertensive titration in primary care (TASMINH4). *Hypertension*. 2019;73(6):1231–1239.

Heather Jarvis, PharmD, MBA, PGY-2 Health System Administration Resident, College of Pharmacy, University of Illinois Chicago, Chicago, IL; PGY-1 Community-Based Pharmacy Resident, School of Pharmacy, University of Missouri-Kansas City, Kansas City, MO; and L and S Pharmacy, Charleston, MO

Sarah Oprinovich, PharmD, BCACP, Clinical Assistant Professor, School of Pharmacy, University of Missouri-Kansas City, Kansas City, MO

Kendall Guthrie, PharmD, BCACP, Clinical Associate Professor, School of Pharmacy, University of Missouri-Kansas City, Kansas City, MO

Appendix 1. Self-Monitoring Blood Pressure Program Pre- and Post-Test

Unique Identifier _____	**Date** _____	**County** _____
Pretest _____	**Posttest** _____	

SELF-MONITORING BLOOD PRESSURE PROGRAM
Pre-/Post-Test
Thank you for participating in our program. Please help us improve our program by filling out this survey.

Rate the following with your current understanding:	
1. I know what the 2 numbers of my blood pressure reading mean	1 2 3 4 5 (Disagree) (Agree)
2. I know how to accurately take my own blood pressure	1 2 3 4 5 (Disagree) (Agree)
3. I know what blood pressure reading is considered to be heart healthy	1 2 3 4 5 (Disagree) (Agree)
4. I know which lifestyle choices will improve my blood pressure readings	1 2 3 4 5 (Disagree) (Agree)
5. I am confident I can manage my blood pressure and keep it at a healthy level.	1 2 3 4 5 (Disagree) (Agree)
6. Answer the following:	a. b. c. d. e. f.
Which of these is the **BEST** blood pressure reading? (Circle correct answer)	140/90 130/88 136/84 188/96 170/90 116/78

Office use only:
Test Score: _____ (Question 6: correct answer 1 point, incorrect 0 points)