

Impact of Social Determinants of Health (SDoH) on Hypertension Control in a Family Medicine Residency Clinic

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Introduction

- In 2020, more than **670k** deaths in the US ***had hypertension as a primary or contributing cause***¹.
- Nearly half of adults in the United States (**47%, or 116 million**) have hypertension, defined as systolic blood pressure greater than 130 mmHg or a diastolic blood pressure greater than 80 mmHg or are taking medication for hypertension².
- Only about 1 in 4 adults (**24%**) with hypertension have their condition under control².
- About half of adults (**45%**) with uncontrolled hypertension have a blood pressure of 140/90 mmHg or higher².
- **80-90 percent** of modifiable contributors to healthy outcomes, broadly termed SDoH, are ***not specifically accounted for by medical care***³.
 - Health-related behaviors
 - Socioeconomic factors
 - Physical environment factors

Introduction cont'd

- Prisma Health Family Medicine Center: January 2022-February 2023
 - Prospective, single site, implementation study
 - Implementation and Analysis of Remote Patient Monitoring (RPM) for Hypertension (HTN) in a Family Medicine Residency Clinic*
- Anthony M. Scott, DO, Mark Humphrey, MD, MPH, Morgan A. Rhodes, PharmD, Deborah Hurley, PhD, MSPH
- Effectiveness of RPM for HTN control
- SDoH data surveyed but not further evaluated/analyzed



Implementation and Analysis of Remote Patient Monitoring (RPM) for Hypertension (HTN) in a Family Medicine Residency Clinic

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INTRODUCTION

-About 45% or 128 million Americans have hypertension (HTN), defined as having a blood pressure greater than 130/80 or are currently taking a medication for HTN.
-HTN is a risk factor for more serious diagnosed like heart disease, and stroke, which are some of the leading causes of death in the United States.
-As defined by the CDC, Remote Patient Monitoring (RPM) is "the use of electronic devices to record a patient's health data for a provider to receive and evaluate later."
-The use of ambulatory blood pressure monitoring to obtain out-of-office blood pressures is recommended and essential for the diagnosis and management of HTN.
-The Prisma Health Family Medicine Center (FMC) is the residency teaching clinic for the family medicine residency in Columbia, SC and is the primary medical home for about 11,000 patients.

OBJECTIVES

-Increase resident and faculty awareness of technology and knowledge of RPM, updated HTN guidelines, and utilization of RPM to manage patients with HTN.
-Evaluate implementation barriers in FMC patients that may impact their ability to participate in RPM and impact their overall HTN management.
-Improve overall blood pressure (BP) and HTN control at FMC using RPM.

METHODS

Clinical Aim	Prospective, observational study
Intervention	Patients given an ambulatory blood pressure monitor and instructions on use. Standard of care for HTN by PCP.
Outcomes	<ul style="list-style-type: none"> Prisma Health FMC patient Age 18 years or older HTN diagnosis and/or Recently diagnosed and/or ≥ 2 SD with no medications for HTN and/or Uncontrolled HTN with annual medical management
Endpoint	<ul style="list-style-type: none"> Primary: overall HTN control (systolic BP < 140 mmHg and diastolic BP < 90 mmHg) at baseline and at the end of the study Secondary: relationship of social determinants of health and HTN control
Educational Aim	<ul style="list-style-type: none"> Residents, anonymous pre and post survey
Intervention	<ul style="list-style-type: none"> Education on RPM Education on HTN guidelines Refer patients for RPM services
Inclusion	All faculty and residents
Endpoints	<ul style="list-style-type: none"> Primary: overall HTN control at FMC (systolic HTN control (systolic BP < 140 mmHg) and diastolic BP < 90 mmHg) at the end of the study period Secondary: pre and post survey responses on knowledge and confidence on RPM for HTN and HTN guidelines

RESULTS

Table 1: HTN RPM Implementation Baseline Patient Characteristics (N=87)

Average Age at Enrollment, years (range)	54.6 (24-54)
Female, n (%)	59 (67.8)
Average Systolic BP, mmHg (range)	155 (100-220)
Average Diastolic BP, mmHg (range)	91 (56-127)

Table 2: Access to Smart Phone, Internet, and MyChart Use (N=87)

Access to smart phone, n (%)	79 (90.8)
Access to internet, n (%)	76 (89.7)
MyChart status is activated, n (%)	49 (56.3)

Figure 1: HTN-RPM Educational Pre and Post Survey of Residents and Faculty



CONCLUSIONS

- Implementation of RPM in a Family Medicine Residency Clinic can be successful.
- Most of the patients of the FMC have access to internet and smart phones which could lead to increased opportunities for RPM or other technology-based interventions.
- In general, there was increased knowledge, confidence, and desire for RPM in future practice amongst residents and faculty.
- Patients enrolled in the study had a statistically significant reduction in SBP and DBP and a larger proportion of patients were controlled at the end of the study.

REFERENCES

1. "High blood pressure" Centers for Disease Control and Prevention, Centers for Disease Control and Prevention. 15 Jun 2021. www.cdc.gov/healthypeople/0-14/high-blood-pressure/
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3. Centers for Disease Control and Prevention. "What is Remote Patient Monitoring (RPM)?" *Centers for Disease Control and Prevention*. 15 Mar 2021. <https://www.cdc.gov/remote-patient-monitoring/>
4. American Heart Association. "Remote Patient Monitoring (RPM)." *American Heart Association*. 10 Feb 2021. <https://www.heart.org/en/health-topics/remote-patient-monitoring>
5. Prisma Health. www.prismahealth.org/about-us

Table 3: Last Measured Blood Pressure (N=87)

Average Systolic BP, mmHg (range)	144 (104-199)
Average Diastolic BP, mmHg (range)	86 (56-127)

Table 4: HTN RPM Baseline vs End of Study (N=87)

BP Managed (<140/<90) at Enrollment, n (%)	19 (21.8)	
BP Managed (<140/<90) at End of Study, n (%)	33 (37.9)	p<0.001
Change in Systolic BP, mmHg (% change)	-10.5 (-6.5, -14.5)	p<0.001 (<0.001)
Change in Diastolic BP, mmHg (% change)	-5.2 (-4.8, -5.6)	p<0.001 (0.002)

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Objectives / Aims

Objective:

- Amass aggregate SDoH and HTN data for statistical analysis of individual SDoH factors' correlation to uncontrolled hypertension.

Aim:

- Identify the most strongly correlated SDoH factors to uncontrolled HTN as an extrapolate of a site-specific patient population to identify area(s) for future intervention to improve HTN control.

Methods

Retrospective, single-site, observational study

- Prisma Health SDOH survey given to all enrollees at the time of enrollment.
 - Close-ended survey
 - Categorical, “Yes/No”, Continuous questions
- Tobacco data additional
- Unique responses paired with individual-specific HTN control outcomes based on RPM data.
- Statistical Tests
 - Chi-squared or Fisher’s Exact Test for **categorical data**
 - Wilcoxon Rank Sum Test for **numeric data**

The screenshot displays a medical chart interface with a questionnaire for Social Determinants of Health (SDOH). The chart is titled "Rooming" and includes a navigation bar with tabs for Chart Review, Rooming, Questionnaire, Plan, Wrap-Up, Communications, Attestation, Careselect, Health Maintenance, and Therapy Plan. The questionnaire is organized into several sections:

- Food Insecurity:** Two questions about food availability and cost over the past 12 months. The first question asks if the patient worried about food running out, and the second asks if the food bought didn't last. Both have response options: Never true, Sometimes true, Often true, and Patient refused.
- Financial Strain:** Two questions about the difficulty of paying for basics and the need to see a doctor due to cost. The first question asks how hard it is to pay for basics, with options from Not hard at all to Very hard. The second asks if there was a time needed to see a doctor but couldn't due to cost, with options Yes, No, and Patient refused.
- Transportation:** One question about lack of transportation affecting medical appointments, with options Yes, No, and Patient refused.
- Stress:** One question about feeling tense, restless, nervous, or anxious, with options from Not at all to Very much, and Patient refused.
- Social Connections:** One question about the frequency of talking or texting with family, friends, or neighbors, with options from Never to More than three times a week, and Patient refused.

The interface also includes a vertical "Open Screenshot" button on the right side and a footer with "ADD ORDER", "ADD DX (3)", "PRINT PWS", and "SIGN ADDENDUM" options.

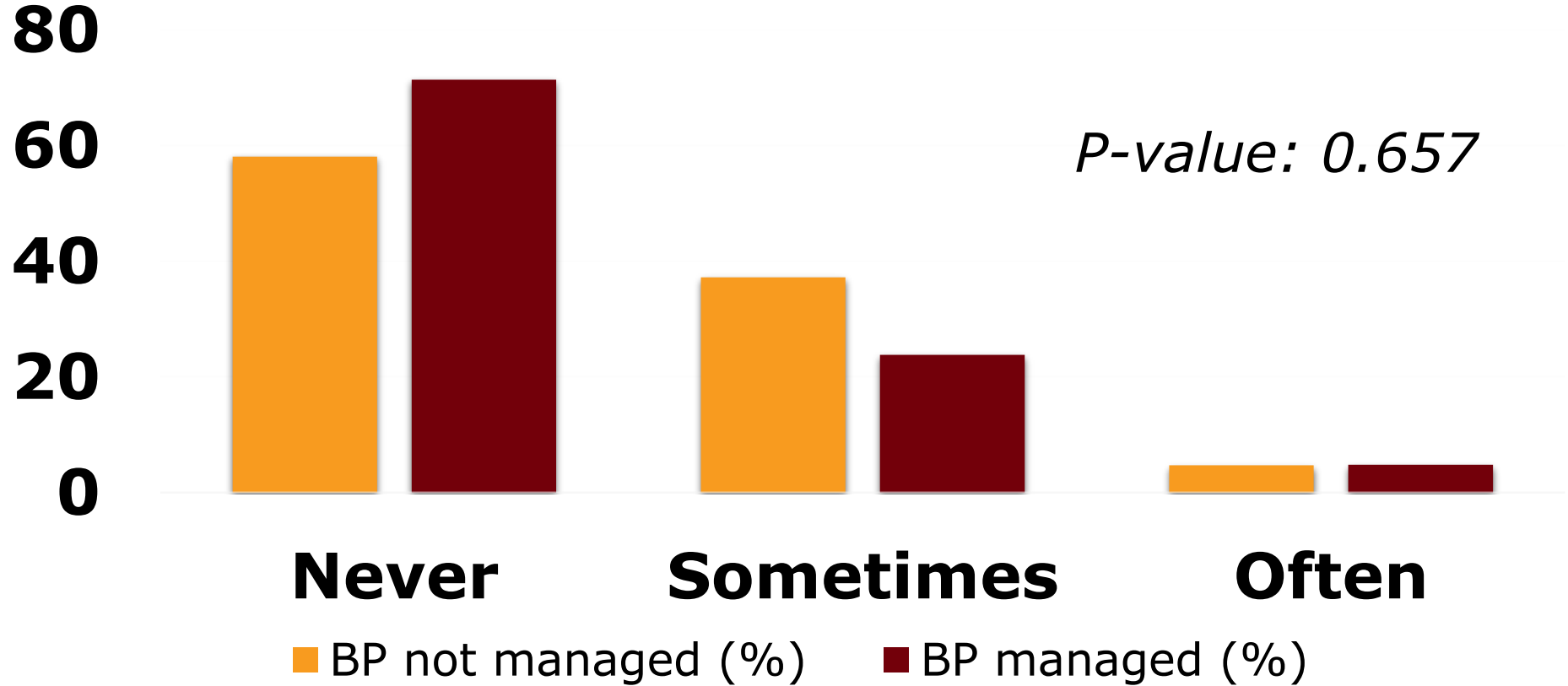
Results

- Enrolled: 87
- SDoH completed: 65
- Sex:
 - Female- 69.2%
 - Male- 30.8%
- Mean Age: 55.3 years (27- 82 years)
- HTN managed vs not managed
 - 22 (33.8%) vs 43 (66.2%)
- Most common factors screening positive
 - Tobacco (31%), Food insecurity (29.9%), and Stress (26.7%)

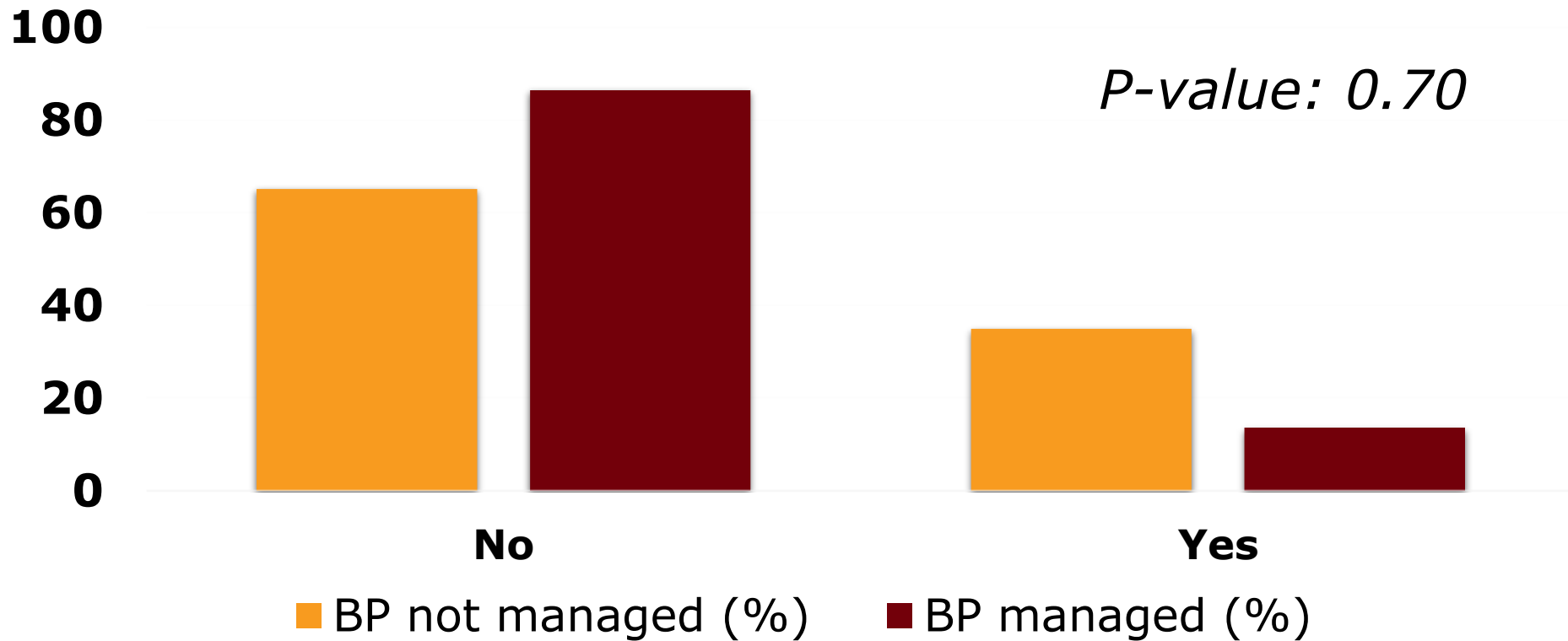


No statistically significant difference between those not managed vs managed in any SDoH factor.

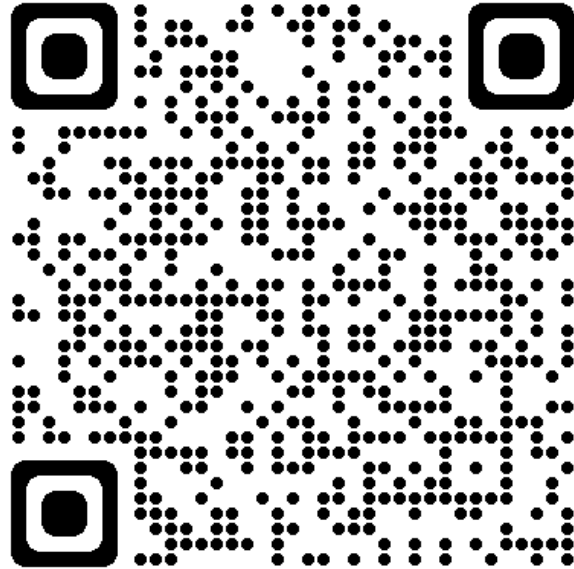
Q1: Within the past 12 months, we worried that our food would run out before we got money to buy more?



Q4: Was there a time in the past 12 months when you needed to see a doctor or buy medications but could not because of cost?



Complete Results



Discussion

- Statistical power
- Selection bias
- Missing data bias
- Self-report bias
- SDoH factors related to monetary resources

Future Directions

- Other chronic disease management

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Questions?