Case Study: Impact of Remote Patient Monitoring on Blood Pressure Control

1. Blood Pressure control

"Impact of Remote Patient Monitoring on Hypertension Control in Adults being treated by Nephology Clinic and Family Medicine clinic: A Case Study Approach"

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2. Background and Rationale

Hypertension is a major risk factor for cardiovascular disease. Lifestyle interventions (e.g., diet, exercise, stress management) are often recommended, but real-world effectiveness varies. A focused case study allows in-depth analysis of individual outcomes and compliance with standard medical treatment with medication and lifestyle recommendations compared to individual outcomes and compliance with standard medical treatment with medication and lifestyle recommendations and **Remote Patient Monitoring**.

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3. Objective

To evaluate the effect of a structured Remote Patient Monitoring program along with care plan changes (lifestyle and medication) on blood pressure control in hypertensive adults enrolled from a minimum of 3 months to a maximum of 27 months time period and having reported a minimum of 20 readings per patient. Case study includes both Female and Male patients. Adult population from 18-100 years of age evaluated.

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4. Study Design

- **Type**: Retrospective analysis of blood pressure improvement receiving standard treatment with addition of Remote Patient Monitoring
- **Duration**: 27 months
- **Setting**: Nephrology/IM and Family Medicine
- **Sample**: 176 hypertensive patients (age 18–100) with uncontrolled high blood pressure

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5. Inclusion Criteria

- Adult Male or Female age 18-100 years of age
- Diagnosed with Stage 1 or 2 hypertension or hypertensive crisis (exhibit 1)
- On antihypertensive medication for at least 3 months
- Willing to submit home blood pressure reading through remote patient monitoring program with digitally connected device.
- Minimum of 3 months of participation time in Remote Patient monitoring program prior to being eligible for this analysis

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6. Data Collection Methods

- **Baseline Assessment**: Blood pressure on current antihypertensive medical therapy.
- **Intervention**: Enrolled in remote patient monitoring blood pressure control program along with continued medication management and lifestyle plan per clinic instructions.
- **Follow-Up**: Daily BP readings. Minimum readings allowed to be included in analysis is once weekly BP checks.
- **Qualitative Interviews**: Minimum of once monthly phone interaction with patient to encourage adherence and accountability.

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7. Outcome Measures

- Primary:

  Improved BP control. Change in systolic and diastolic BP for all patients enrolled between 12-108 weeks, Adult between 18-100 years old, reporting a minimum of 20 BP readings.

- Secondary:

  All patients greater than or equal to 65 years of age: Improved BP control. Change in systolic and diastolic BP for all patients enrolled between 12-108 weeks, Adult between 18-100 years old, reporting a minimum of 20 BP readings.

All patients less than 65 years of age: Improved BP control. Change in systolic and diastolic BP for all patients enrolled between 12-108 weeks, Adult between 18-100 years old, reporting a minimum of 20 BP readings.

Female Greater than or equal to 65 years of age: Improved BP control. Change in systolic and diastolic BP for all patients enrolled between 12-108 weeks, Adult between 18-100 years old, reporting a minimum of 20 BP readings

Female Less than 65 years of age: Improved BP control. Change in systolic and diastolic BP for all patients enrolled between 12-108 weeks, Adult between 18-100 years old, reporting a minimum of 20 BP readings

Male Greater than or equal to 65 years of age: Improved BP control. Change in systolic and diastolic BP for all patients enrolled between 12-108 weeks, Adult between 18-100 years old, reporting a minimum of 20 BP readings

Male less than 65 years of age: Improved BP control. Change in systolic and diastolic BP for all patients enrolled between 12-108 weeks, Adult between 18-100 years old, reporting a minimum of 20 BP readings

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8. Data Analysis

- **Quantitative**: Compared starting BP at patient enrollment date (enrollment dates varied throughout the evaluated time frame) to last reported BP for this analysis done through May 2025. Retrospective analysis of data from 2/1/2023-5/1/2025.

- Total number of patients studied: 176

- Total number of Females by age category

  Females < 65 y/o = 37

  Females>= 65 y/o = 68

- Total Number of Males by age category

  Males <65 y/o = 28

Males >= 65 y/o = 43

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9. Ethical Considerations

- Informed consent to be enrolled in remote patient monitoring program
- Privacy and confidentiality maintained

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10. Expected Results

- Moderate reduction in BP
- Moderate variability in adherence
- Insight into barriers and motivators for lifestyle change

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11. Results

Primary endpoint:

Overall reduction in systolic BP for all patients: **-12.8mmHg reduction**
Overall reduction in diastolic BP for all patients: **-7.23mmHg reduction**

Secondary endpoints: (chart 1)

BP reduction in females <65 y/o
Systolic: **-7.3mmHg reduction**
Diastolic: **-5.5mmHg reduction**

BP reduction in females >= 65 y/o
Systolic: **-11.40mmHg reduction**
Diastolic: **-5.5mmHg reduction**

BP reduction in males <65 y/o
Systolic: **-10 mmHg reduction**
Diastolic: -**7.86 mmHg reduction**

BP reduction in males >= 65 y/o
Systolic: **-22.05 mmHg reduction**
Diastolic: **-10.95mmHg**

Largest reduction in a single patient:

Male > 65 y/o, enrolled 420 days, reported 470 readings
Systolic BP reduction: **-81mmHg**
Diastolic BP reduction: **-36mmHg**

Highest Number of enrolled days that also had at least once daily BP reporting:

Female >65 y/o
807 days enrolled
807+ BP readings reported
Improved systolic BP control: **-15mmHg reduction**

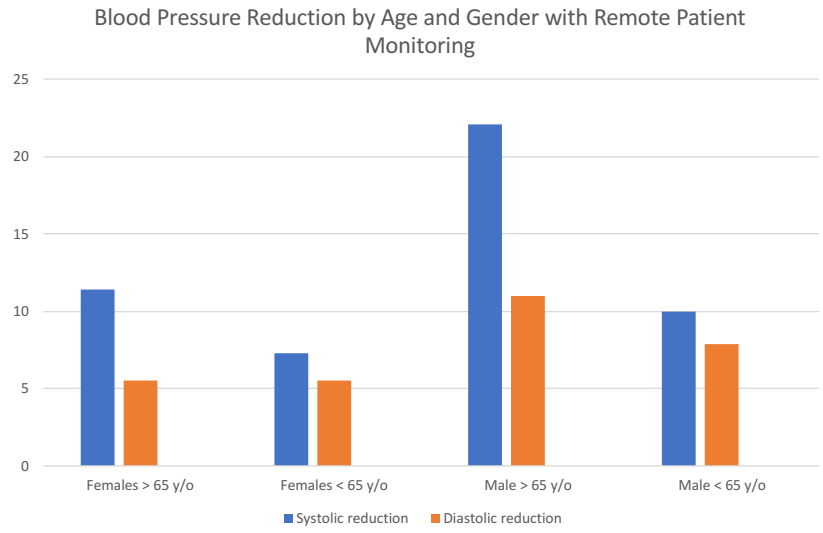
Male <65
747 days enrolled
747+BP readings reported
Improved systolic BP control: **-41mmHg reduction**

Fewest number of enrolled days that also had at least once daily BP reporting:

Female > 65 y/o
90 days enrolled
90+ BP readings reported
Improved systolic BP control: **-26mmHg**

Male > 65 y/o
91 days enrolled
91+ BP readings reported
Improved systolic BP control: **-23mmHg**

Chart 1.



Conclusion:

Adding Remote Patient Monitoring to standard medical care for hypertensive patients improves blood pressure control across all ages and genders.

This case study showed moderate to significant reduction in both systolic and diastolic blood pressure.

Remote Patient Monitoring greatly reduced the likelihood of cardiovascular events in this patient population.

A **moderate to significant blood pressure reduction** (exhibit 2) typically refers to a measurable decrease in systolic and/or diastolic blood pressure that has clinical relevance in reducing cardiovascular risk as noted with this study. In hypertension management (e.g., per ACC/AHA or NICE guidelines), a **10 mmHg reduction in systolic BP** can reduce risk of major cardiovascular events by ~20%. Overall, the 10-mmHg reduction in systolic blood pressure translated into a 20% reduction in major cardiovascular events, a 17% reduction in coronary heart disease, a 27% reduction in stroke, a 28% reduction in heart failure, and a 13% reduction in all-cause mortality. The benefits of blood pressure reduction are observed across different populations, including those with and without a history of cardiovascular disease, and at varying baseline blood pressure levels.

Exhibit 1.

Blood Pressure Categories

BLOOD PRESSURE CATEGORY	SYSTOLIC mm Hg (upper number)		DIASTOLIC mm Hg (lower number)
NORMAL	LESS THAN 120	and	LESS THAN 80
ELEVATED	120-129	and	LESS THAN 80
HIGH BLOOD PRESSURE (HYPERTENSION) STAGE 1	130-139	or	80-89
HIGH BLOOD PRESSURE (HYPERTENSION) STAGE 2	140 OR HIGHER	or	90 OR HIGHER
HYPERTENSIVE CRISIS (consult your doctor immediately)	HIGHER THAN 180	and/or	HIGHER THAN 120

heart.org/bplevels

Exhibit 2.

General Definitions defining level of blood pressure reduction:

Reduction	Systolic BP (SBP)	Diastolic BP (DBP)
Mild	5–9 mmHg	3–5 mmHg
Moderate	10–19 mmHg	6–12 mmHg
Significant (or Large)	≥20 mmHg	≥13 mmHg

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May 2025