Home Blood Pressure Telemonitoring and Pharmacist Care to Improve Hypertension Control

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Disclosures

- Funded by grants and contracts from NIH, CDC and Minnesota Department of Health
- No commercial funding

Why controlling high blood pressure is important

Elevated blood pressure (BP) is the single largest contributor to:

All-cause mortality

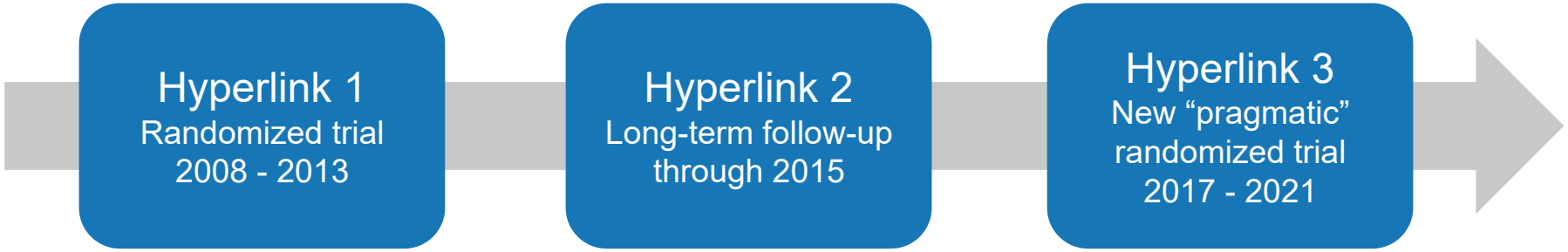
Cardiovascular mortality

- Hypertension control has deteriorated over the last 10 y, especially during the pandemic
- Disparities got worse
- While some improvement in BP control has happened in recent 1-2 years, we are still unsure if improvements will plateau or continue

<50% with hypertension are well-controlled

Hyperlink: 2008 - 2021

Three research projects, $10M in federal funding



Outcomes:
BP control over 18 mo

Outcomes:
BP change over 5 years and CVD events

Outcomes:
BP change over 2 years and patient-reported outcomes

Pharmacists as Members of the Care Team

- Co-located in HealthPartners primary care clinics, use and document in EHR
- Collaborative Practice Agreements providing prescriptive authority and the ability to order laboratory tests to monitor for efficacy and safety of medications for a variety of chronic diseases using Comprehensive Medication Management
- Focused on optimizing medication use and outcomes

The Patient Care Process for Delivering Comprehensive Medication Management (CMM): Optimizing Medication Use in Patient-Centered, Team-Based Care Settings. CMM in Primary Care Research Team. July 2018. Available at *http://www.accp.com/cmm_care_process*

Hyperlink 1 & 2 Trial (2008-2016)

- Cluster-randomized controlled trial
- Primary care clinics (N=16) at HealthPartners Medical Group with MTM pharmacists
- Adult patients with BP≥140/90 confirmed in research clinic
- Primary care clinics randomly assigned to 2 groups:
  - Usual care (UC)
  - Telemonitoring Intervention (TI) combining pharmacist-led care management and home BP telemonitoring
- Research clinic visits at 6, 12, 18, and 54 months for BP measures and surveys

Margolis KL. *Contemp Clin Trials.* 2012;33(4):794-803

Telemonitoring Intervention

- Home blood pressure telemonitor from commercial vendor
  - Transmits stored BP to pharmacist via password-protected website
  - Patient measures BP 3 days per week, a.m. and p.m. (at least 6 readings/week)
- Pharmacist care management
  - 1st visit face-to-face, then by phone every 2-4 weeks x 6 months
  - Adjusts antihypertensive therapy using algorithm from collaborative practice agreement with PCP
  - Emphasizes lifestyle strategies and medication adherence
- Intervention for 12 months, post-intervention observation
  - Months 0-6: Intensive phase
  - Months 7-12: Maintenance phase, phone visits every 2 months x3
  - Months 13-54: return to usual primary care without telemonitoring

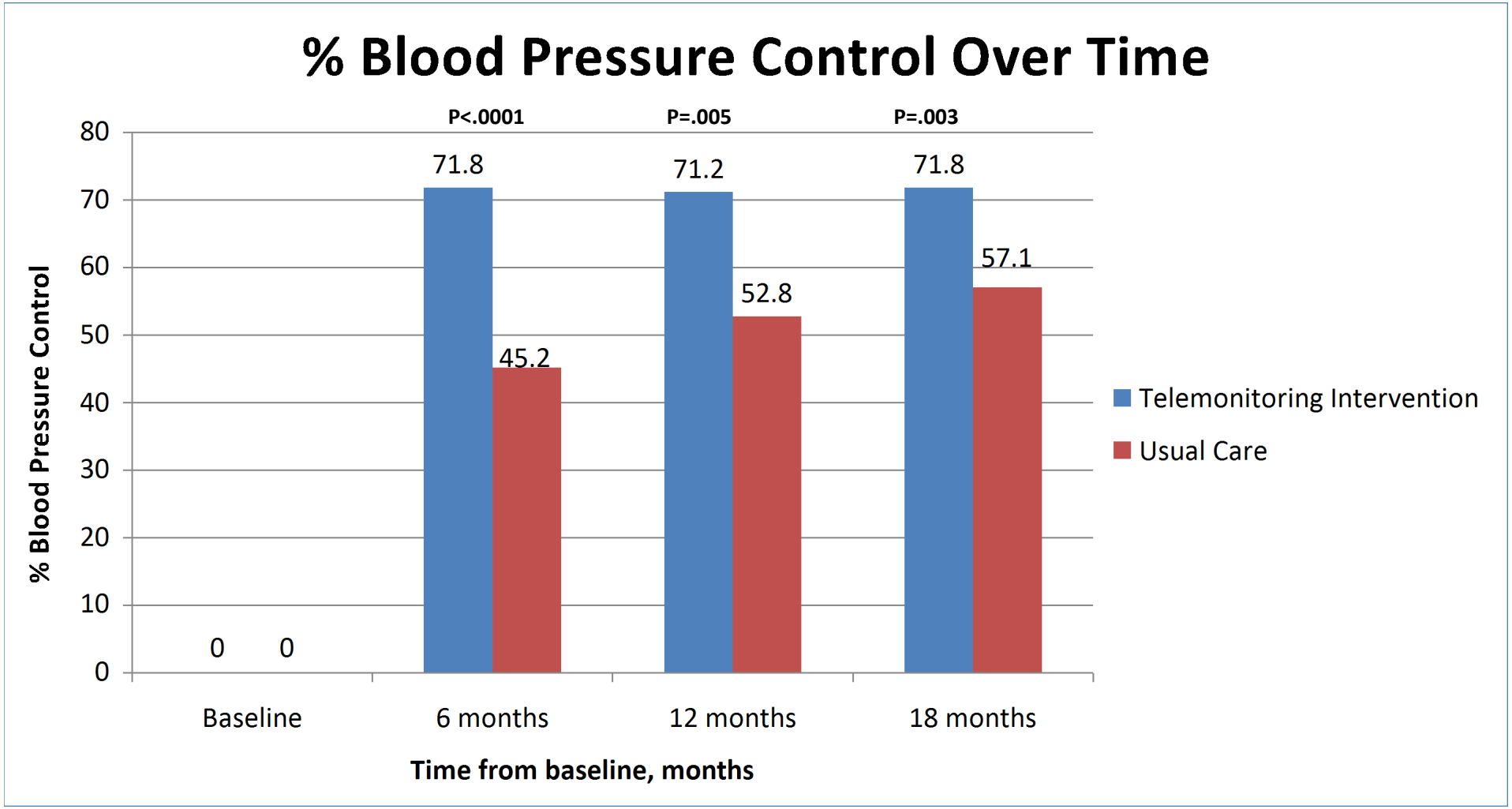
Participant Baseline Characteristics

- Mean age 61 y.
- Mean BP 148/85 mm Hg
- Mean number of antihypertensive drugs 1.5
- 45% female
- 82% non-Hispanic white
- 32% with cardiovascular disease or diabetes

JAMA 2013;310(1):46-56

Hyperlink 1 Results

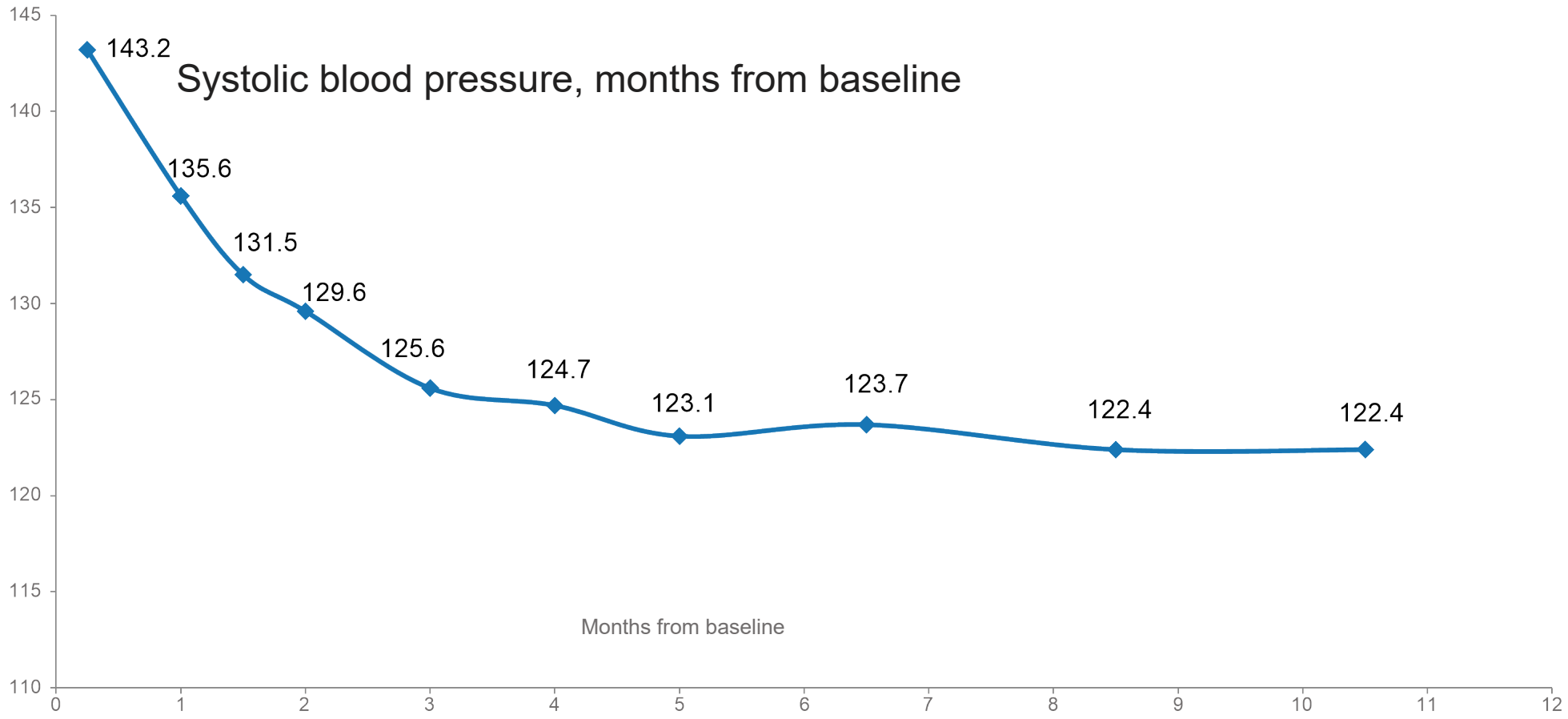
Better BP control with telemonitoring and pharmacist care over 18 months



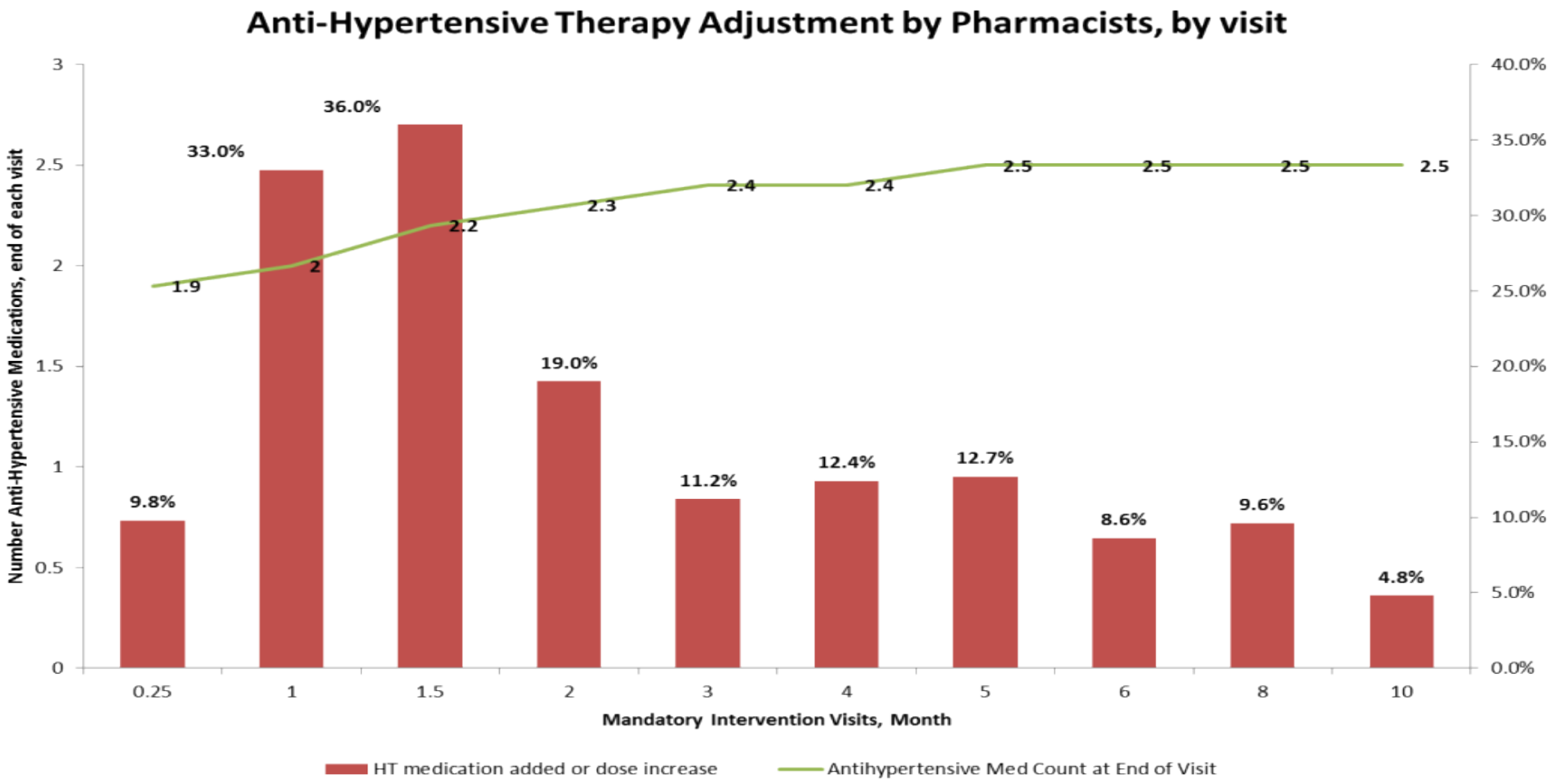
***JAMA* 2013;310(1):46-56.**

Hyperlink 1 Results: Home BP during 12-month program

Blood pressure improved rapidly, then stayed under control



Pharmacist Medication Adjustment



Estimated heart disease event costs (5 years)

Net savings of $1,241 per patient in the intervention group

	Intervention (n=228)		Control (n=222)	
	Events	Estimated $	Events	Estimated $
Heart Attack (MI)	5	$273,000	11	$593,000
Stroke	4	$174,000	12	$506,000
Heart failure	5	$249,000	3	$253,000
Coronary bypass/stent	2	$62,000	10*	$187,000
Total	15	$758,000	36	$1,538,000
		Difference		-$780,000

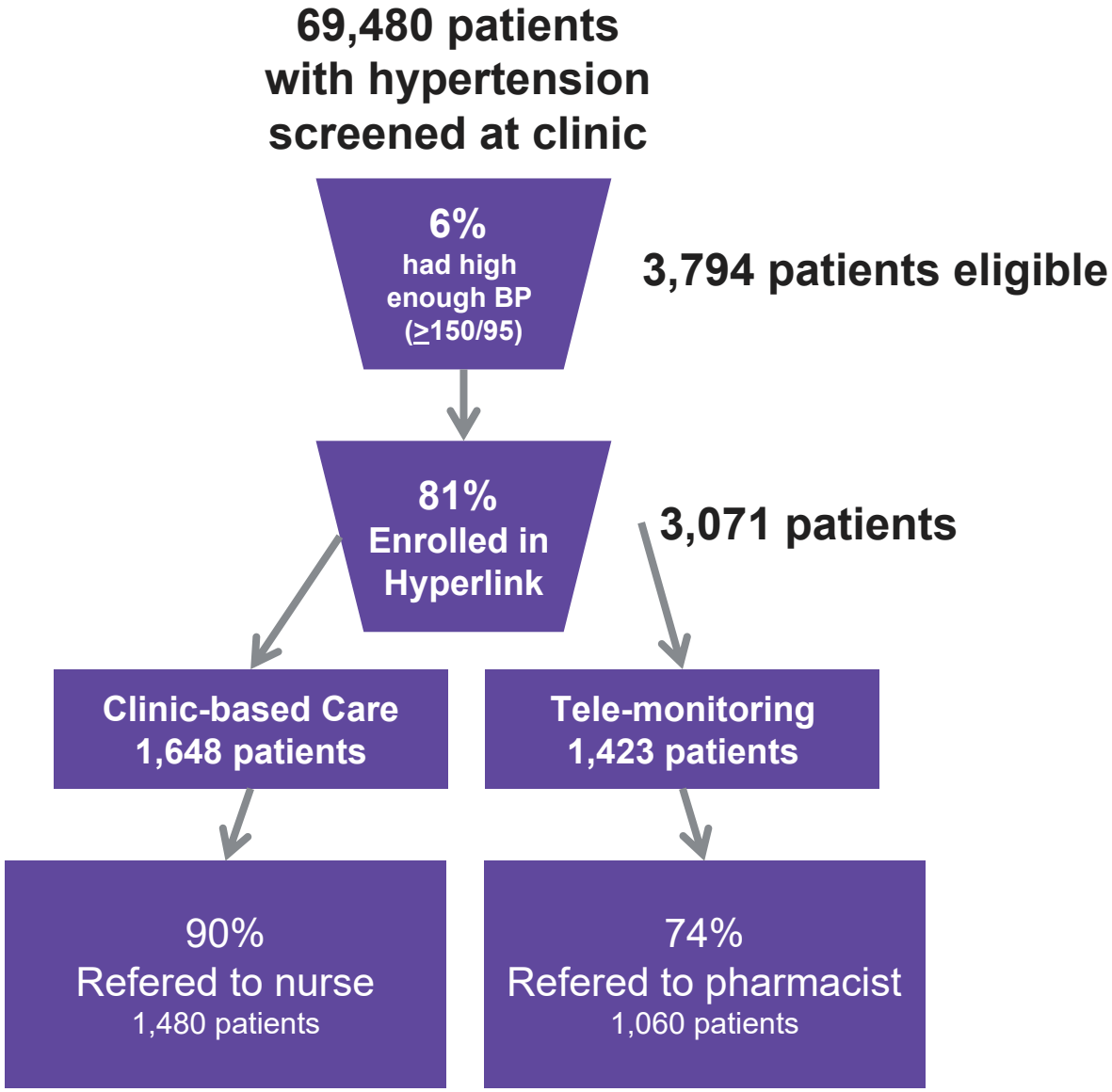
Primary outcome (MI + stroke + HF+ CV death)
OR= 0.49 (95% CI, 0.21-1.13), *p*=0.09
Secondary outcome (above + revascularization)
OR= 0.48 (95% CI, 0.22-1.08), *p*=0.08

Hyperlink 3 – Pragmatic Trial Study Design

- Like Hyperlink 1, clinics (N=19) were randomized to telemonitoring + pharmacist care. The comparison group was “best practice clinic-based care” reflecting improvements over time.
- Unlike Hyperlink 1, we used an Epic algorithm to enroll patients at routine primary are visits
- The blood pressure level for eligibility was raised to ≥150/95 because so many patients were ≥140/90
- We aimed to enroll many more patients

Funded by Patient Centered Outcomes Research Institute IHS-1507-31146
Contemp Clin Trials 2020;92:105939

Hyperlink 3 enrollment



Participant Baseline Characteristics

- Mean age 60 y.
- Mean BP 158/92 mm Hg (vs. 148/85 in Hyperlink 1)
- Mean number of antihypertensive drugs 1.7 (vs. 1.5 in Hyperlink 1)
- 53% female
- 69% non-Hispanic white (vs. 82% n Hyperlink 1)
- 25% with diabetes
- 17% with cardiovascular disease

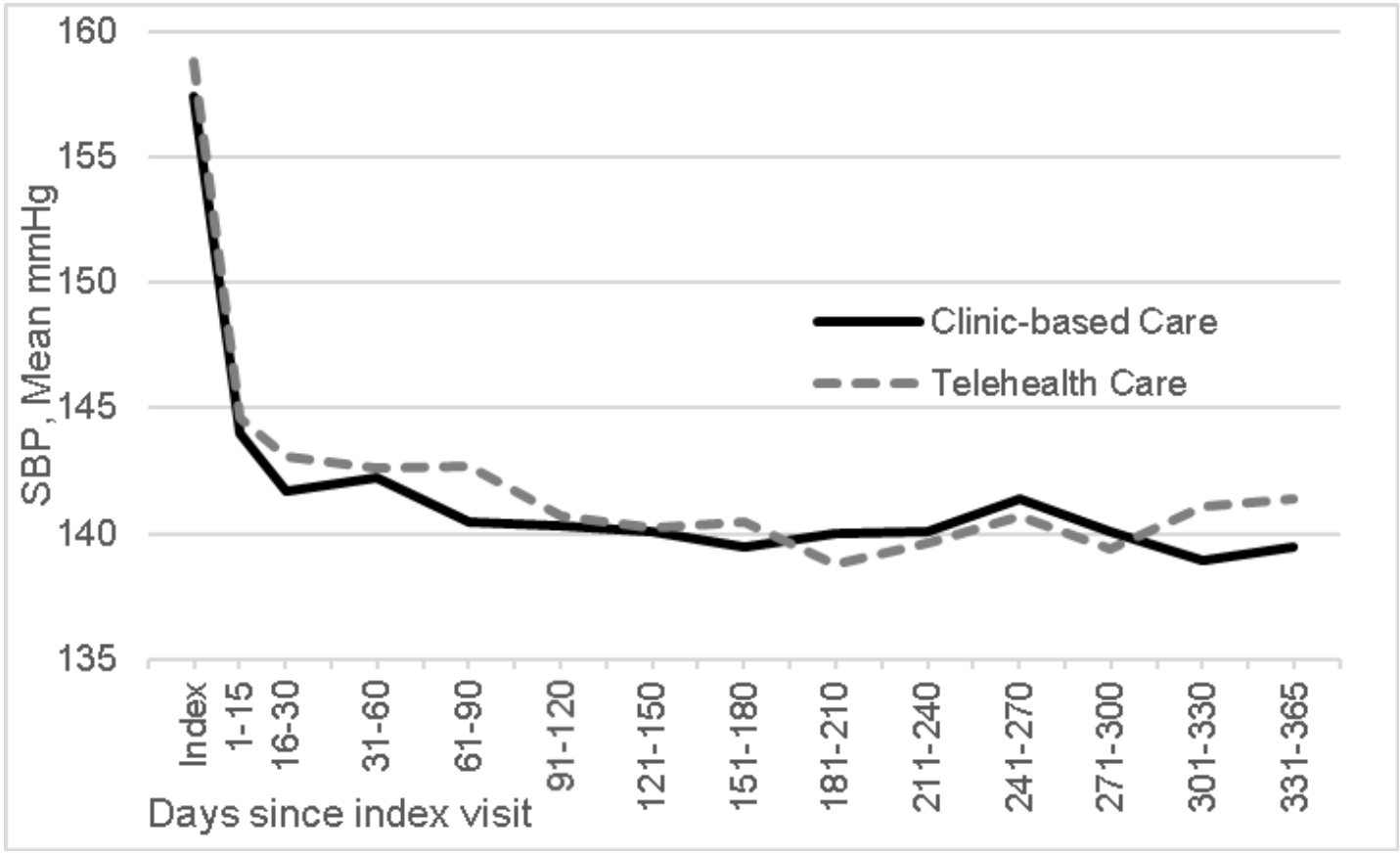
JAMA 2013;310(1):46-56

What happened after Hyperlink 3 enrollment?

- Nearly everyone eventually received follow-up, but only 1/3 went to the nurse (clinic-based care) or pharmacist (tele-monitoring) within 6 weeks, median time to appointment was 3 weeks
- Engagement was strong after a visit with the pharmacist

Telehealth-enrolled patients who met with pharmacist	38% (n=534)
Patients who submitted at least 1 BP	81%
Median follow-up visits (mostly by phone)	6 visits
Median duration of telemonitoring	15 weeks
Median home BPs sent per week	5 per week
Sent ≥6 home BPs per week in ≥6 of first 12 weeks	45%

Hyperlink 3 SBP by Treatment Group

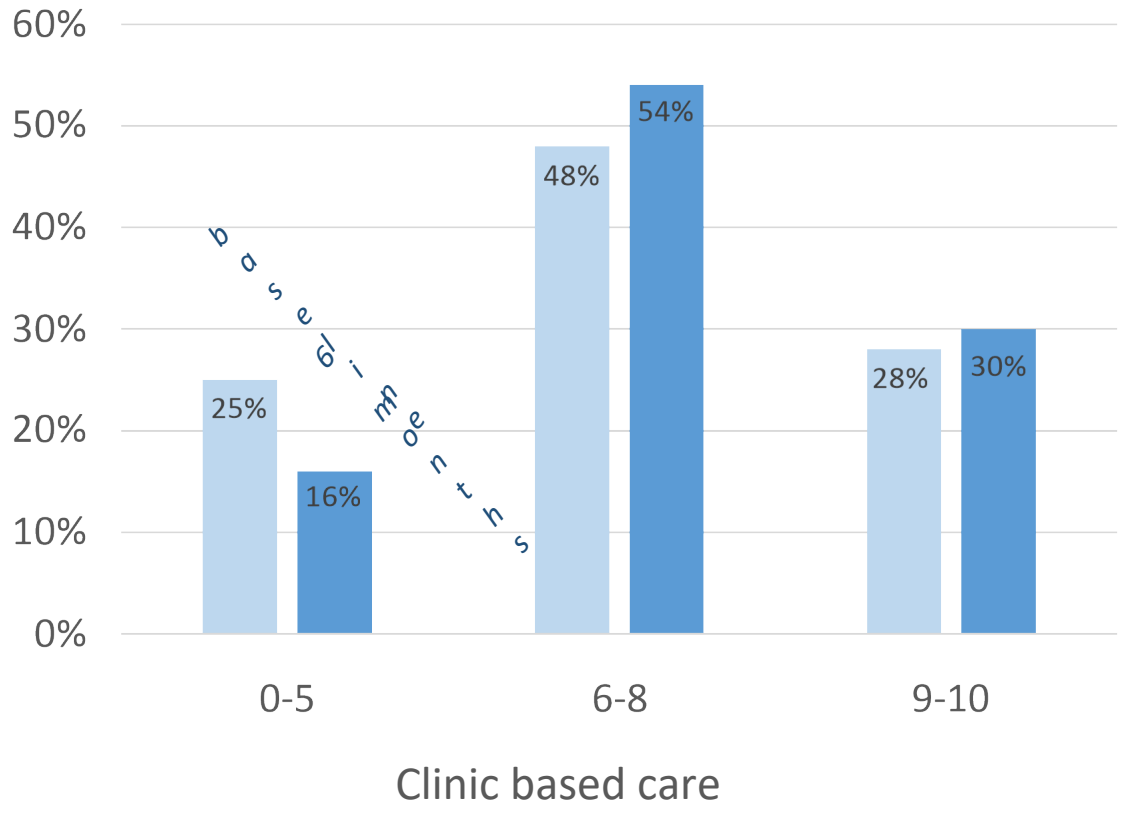


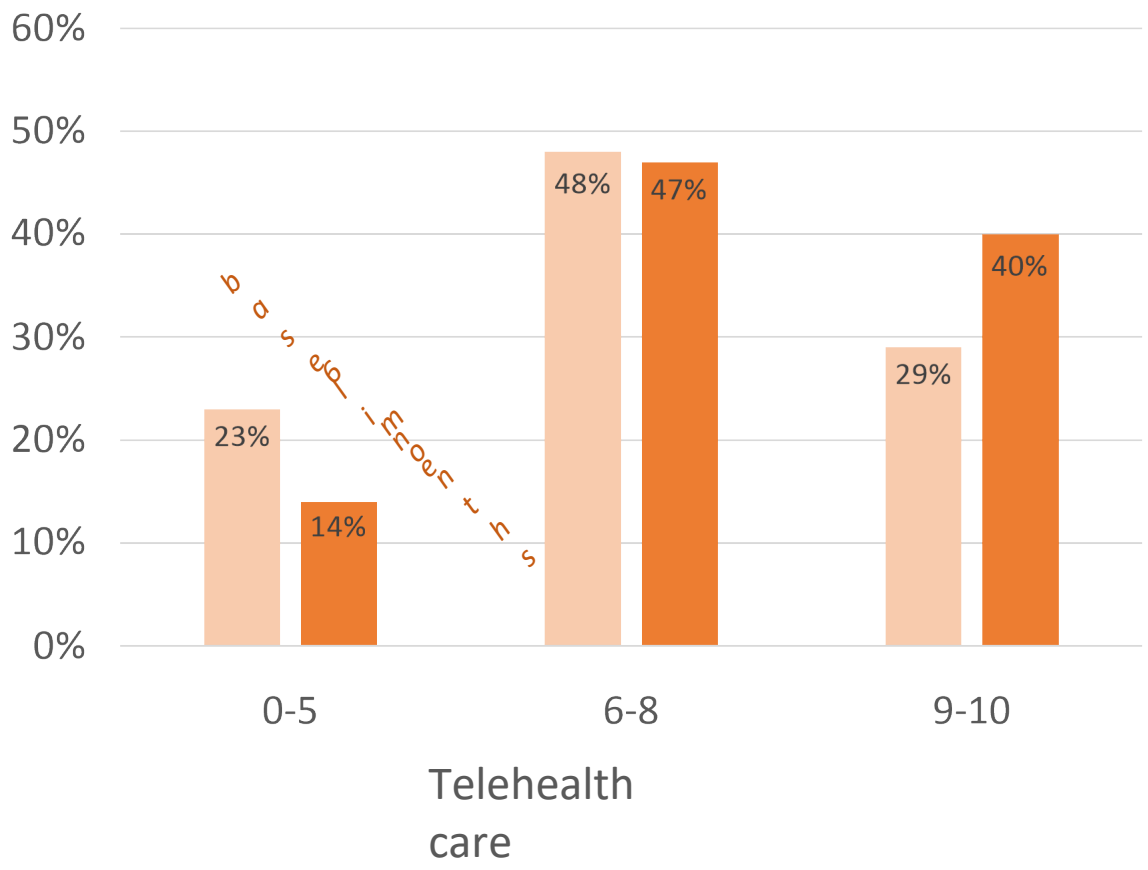
Number of classes of BP medications similar in both groups at baseline (mean=1.7) and at 12 months (mean=2.1)

Satisfaction with BP Care: Baseline and 6 months

Using any number from 0-10, where 0 is the worst possible health care for your blood pressure and 10 is the best possible health care for your blood pressure, what number would you use to rate your health care for your blood pressure in the past 6 months?

9-10 vs. 0-8: RR 1.26 (95% CI 1.07-1.47)





Hyperlink 3 Patient-Reported Survey Data

Burden of caring for BP: Please consider everything you have to do to take care of your blood pressure. How much of a problem is . . . (very big/big/moderate/some vs none)

	Clinic-based Care		Telehealth Care		Relative Risk	
Survey item	Baseline	6 mo	Baseline	6 mo	RR adj	95% CI
Inconvenience of Measuring BP, %	32.3	26.9	29.5	29.4	1.21	0.97-1.50
Inconvenience of Phone visits, %	18.0	19.6	20.0	13.7	**0.64**	0.45-0.92
Inconvenience of Scheduling visits	27.5	29.1	29.8	21.9	**0.70**	0.55-0.89

Hyperlink Summary and Take-Home Messages

- For BP lowering, pharmacist care + telemonitoring is superior to “usual care”, but similarly safe and effective as best practice clinic-based care
- Patients more satisfied with pharmacist care + telemonitoring, did more self-monitoring, found care model convenient
- Initial patient engagement is key, consider offering other choices to eligible patients not interested in working with pharmacist or telemonitoring
- Early addition of $\geq$1 medication class (no med difference=no BP difference)
- Flexible, patient-tailored visit schedule and duration is probably OK
- Consider how to get patients to continue monitoring less intensively once goal is attained, and how to respond if BP becomes uncontrolled again

Questions?

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HealthPartners Institute

Collaborative Practice Agreement
Algorithm for Drug Initiation & Titration

Patient drug status	Patient BP status	Pharmacist Action
Any BP drugs, adherent	BP controlled ≥75% of readings	• Continue present treatment • Reinforce lifestyle modification
Not on drug treatment	BP above goal by < 20 / 10 mmHg	• Begin with diuretic (or CCB, or ACE/ARB if non-black) • Reinforce lifestyle modification
Not on drug treatment	BP above goal by ≥20 /10 mmHg	• Begin with combo of diuretic and ACE/ARB or CCB • Reinforce lifestyle modification
1-2 BP drugs, adherent	BP above goal by < 20 / 10 mmHg	• Add thiazide diuretic if not part of regimen, otherwise add synergistic 2nd line drug • Reinforce lifestyle modification
1-2 BP drugs, adherent	BP above goal by ≥20 /10 mmHg	• Add synergistic combination of two more drugs • Reinforce lifestyle modification
4+ BP drugs, adherent	BP uncontrolled	• Probe more for non-adherence • Consult PCP regarding reasons for resistant hypertension • Refer for work-up for secondary hypertension if needed
Any BP drugs, not adherent	BP uncontrolled	• Address reasons for non-adherence • Adjust regimen, monitor adherence
Any drug status	BP ≥180/110mmHg	• Probe more for non-adherence • Consult PCP regarding resistant hypertension • Refer for work-up for secondary hypertension if needed

HomeBP Telemonitoring Patient (click to view)

Home BP Flowsheet

Print

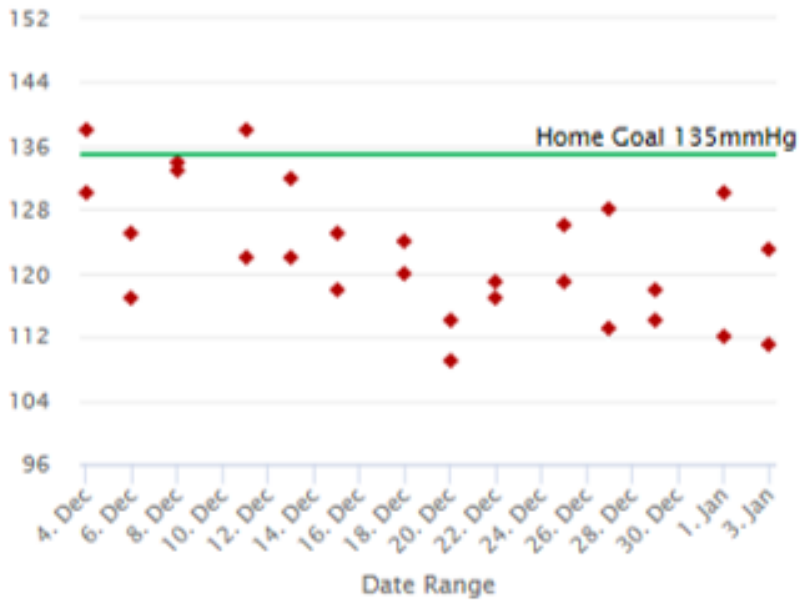
Home BP Summary

Home Goal	Date Range	# of Readings	Systolic	Diastolic	% at Goal
135/85	Sun Dec 03 2017 - Wed Jan 03 2018	28	High:138 Average:122 Low:109	High:82 Average:73 Low:67	92% (combined readings)

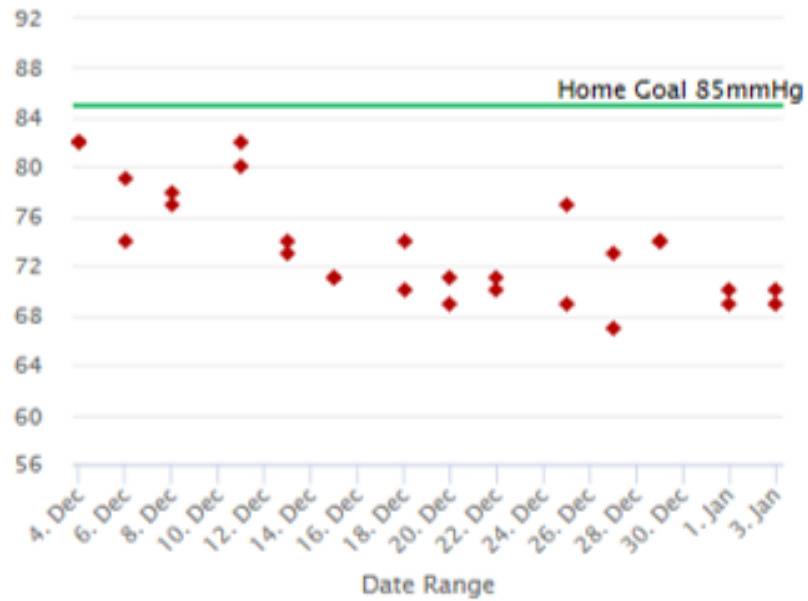
Summary Detailed Date Range: Home Goal: 130/80 135/85

Sun Dec 03 2017 - Wed Jan 03 2018

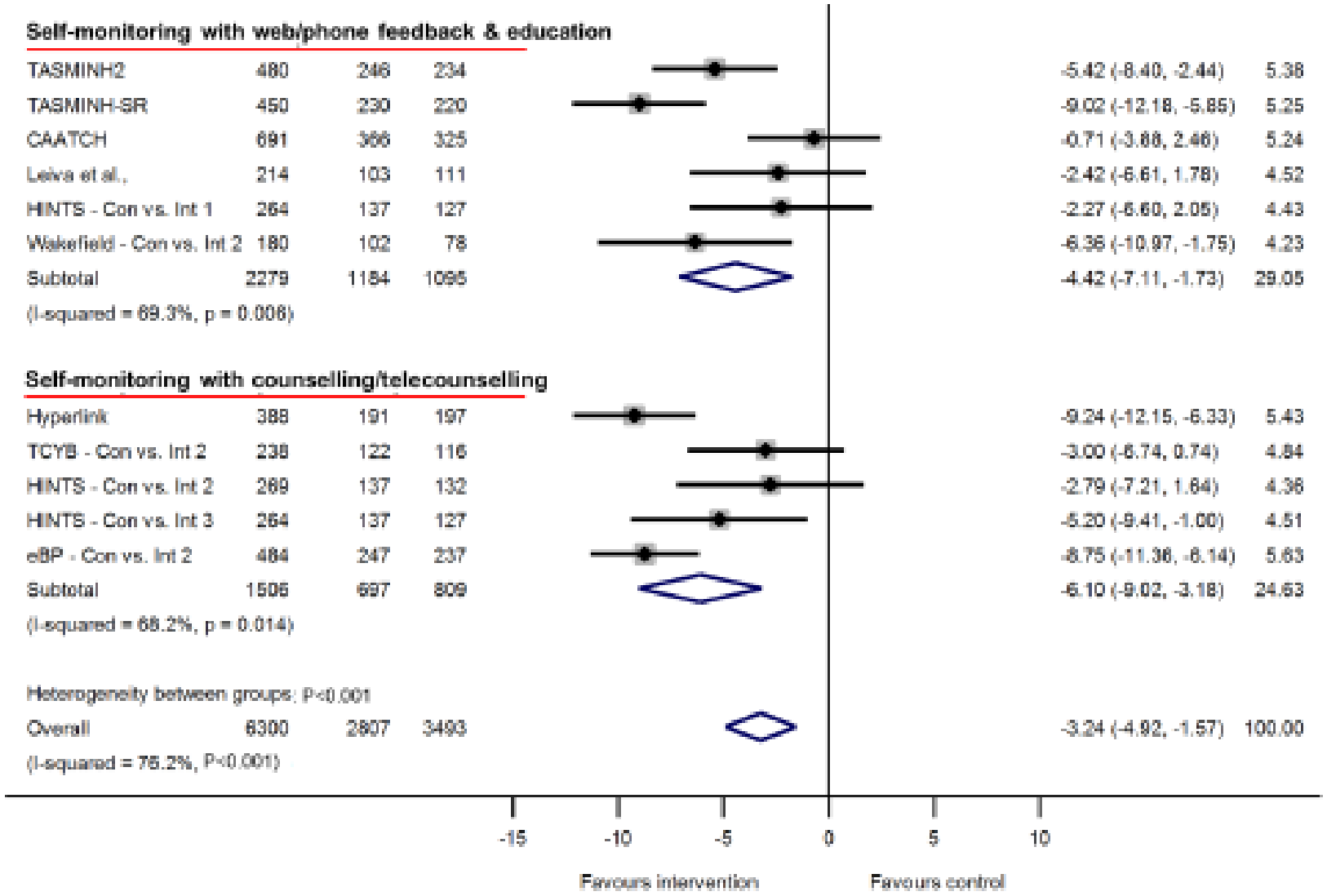
Systolic BP



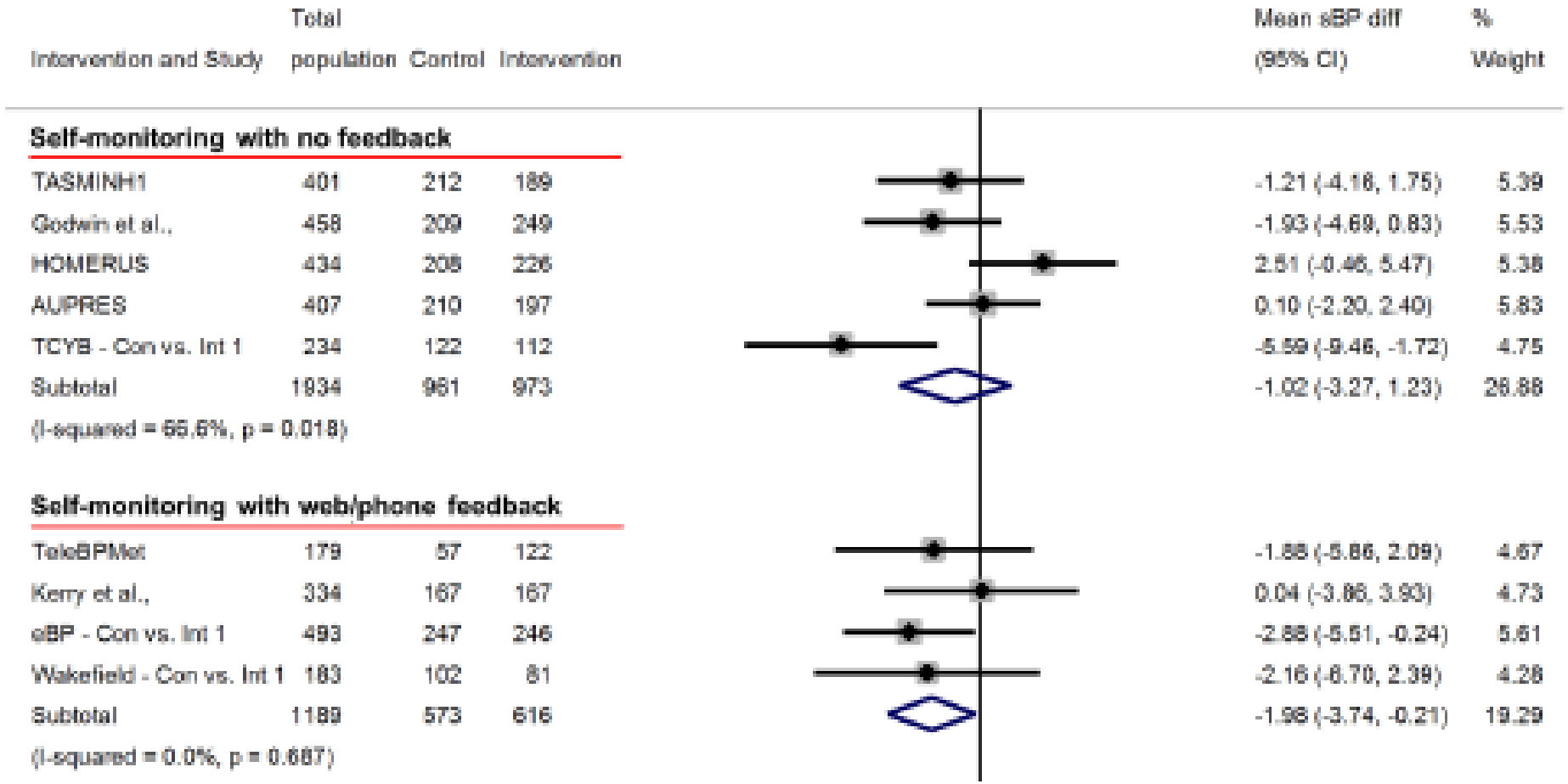
Diastolic BP



SMBP with mod/high co-intervention
Effect on SBP at 12 months



SMBP with no/low co- intervention
Effect on SBP at 12 months

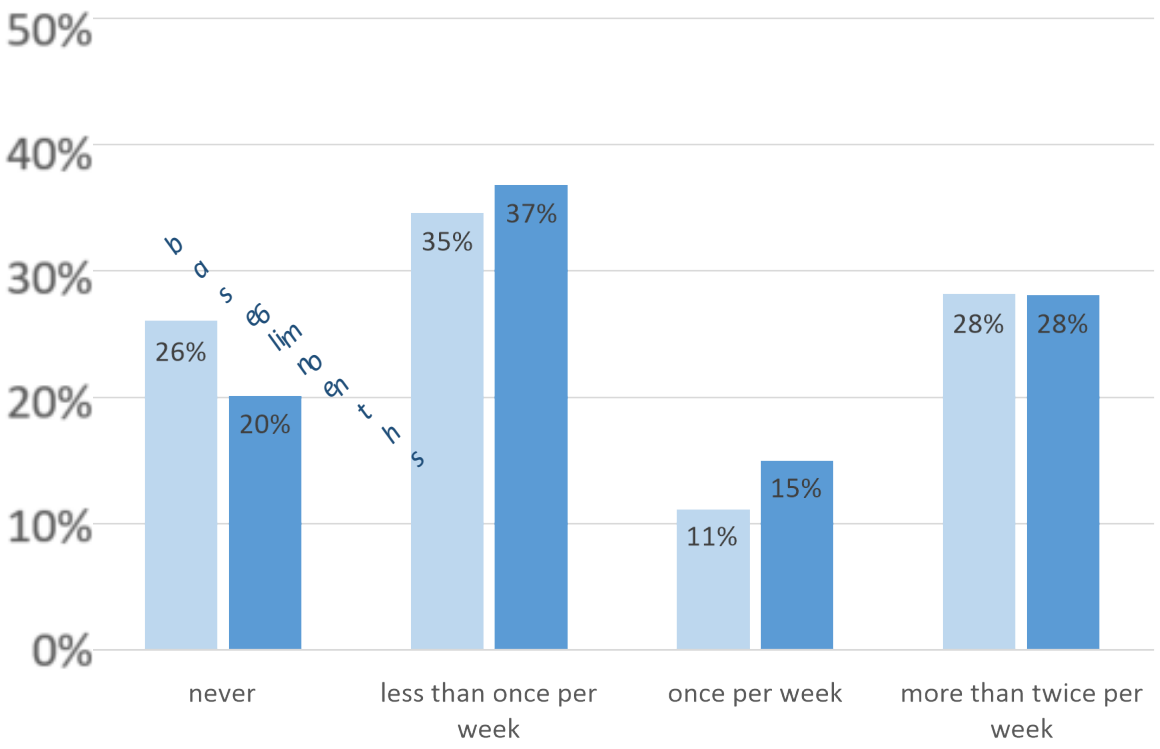


Tucker KL. PLOS Med 2017;14:e1002389

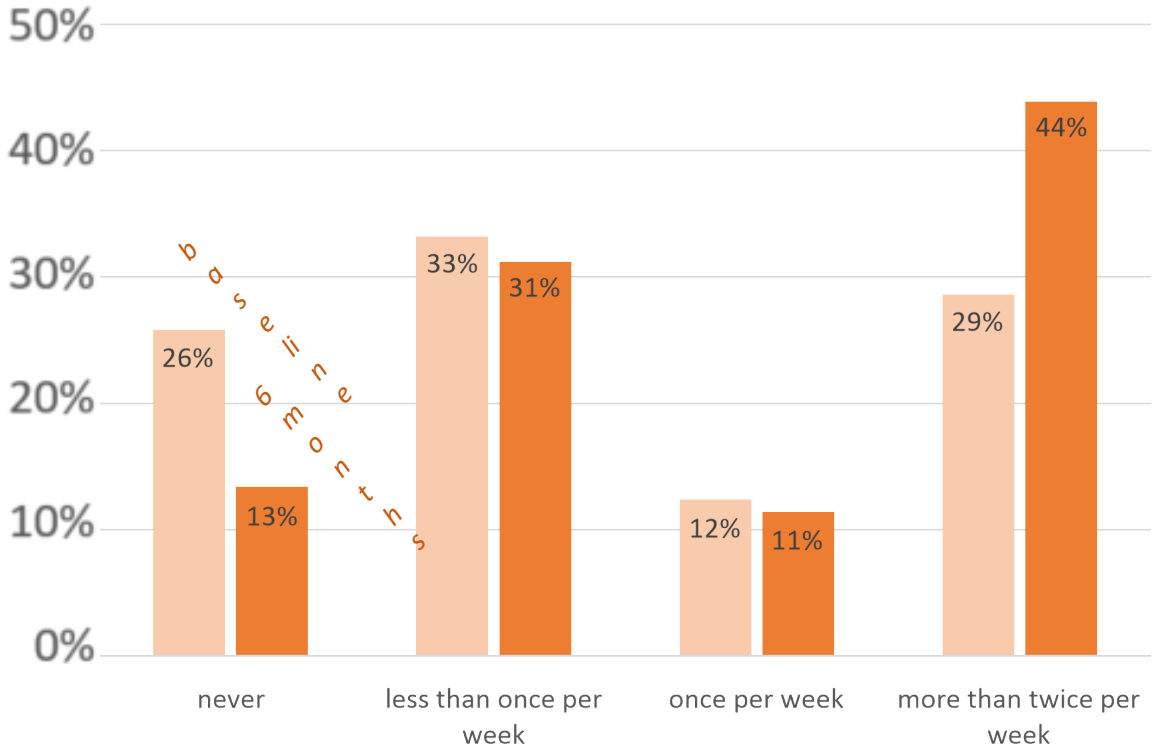
Frequency of home blood pressure monitoring:

In the last 6 months, on average how many times did you measure your blood pressure outside of a clinic visit?

≥2x/wk vs. less: RR 1.55 (95% CI 1.23-1.96)



Clinic based care



Telehealth care

Elements of Effective Team-based Care + Telemonitoring

- Care team member(s) able to take responsibility for enrollment, teaching, ongoing monitoring, evidence-based treatment algorithm
- Systematic identification and enrollment of eligible patients
- Provision of low-cost, simple-to-use, validated BP telemonitor (cellular chip best, but Bluetooth-to-Smartphone can work)
- Home BP data uploaded to EHR (dedicated field), with data visualization tools
- Alerts to non-physician care team member
- Dashboard and data summarization