

# Implementing Interprofessional Approaches to the Management of Hypertension

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## Speaker Disclosure

- Ms. Bradley-Guidry has disclosed that she has no actual or potential conflict of interest in relation to this topic.

## Educational Objectives

By the end of this activity, the participant will be better able to:

- Describe the proper utilization of ambulatory blood pressure monitoring and home blood pressure measurement.
- Discuss interprofessional approaches to achieve hypertension goals.

# Classification of Hypertension

## JNC 7 Definitions

Blood Pressure (mm Hg)		Category
Systolic	Diastolic	
<120	and <80	Normal
120-139	or 80-89	Prehypertension
140-159	or 90-99	Stage 1 hypertension
≥160	or ≥100	Stage 2 hypertension

# Making the Diagnosis of Hypertension

- The diagnosis of hypertension is based on average of 2 or more readings  $>140/90$  mm Hg, taken at each of 2 or more visits after an initial screening.
- If the initial average of 2 or more readings is  $>160/100$  should be seen in less than 1 month

# Reliable Blood Pressure Measurement

- Seated Position after 5 minutes quiet rest
- Proper cuff sizing
- Arm at heart level
- The average of at least 2 consecutive measurements
- No coffee or smoking within 30 minutes of measurement



# Office Measurement of BP

- Deceptively simple
- Manual
  - Hg (no longer used)
  - Technical error and bias
- Automatic
  - Oscillometric relies on MAP and computer algorithm
  - Eliminates bias but still subject to technical error



# Definitions of Hypertension Subtypes

## White Coat Hypertension

Synonym: isolated office hypertension

Hypertensive by clinic (office) measurement and normotensive by ambulatory measurement

## Masked Hypertension

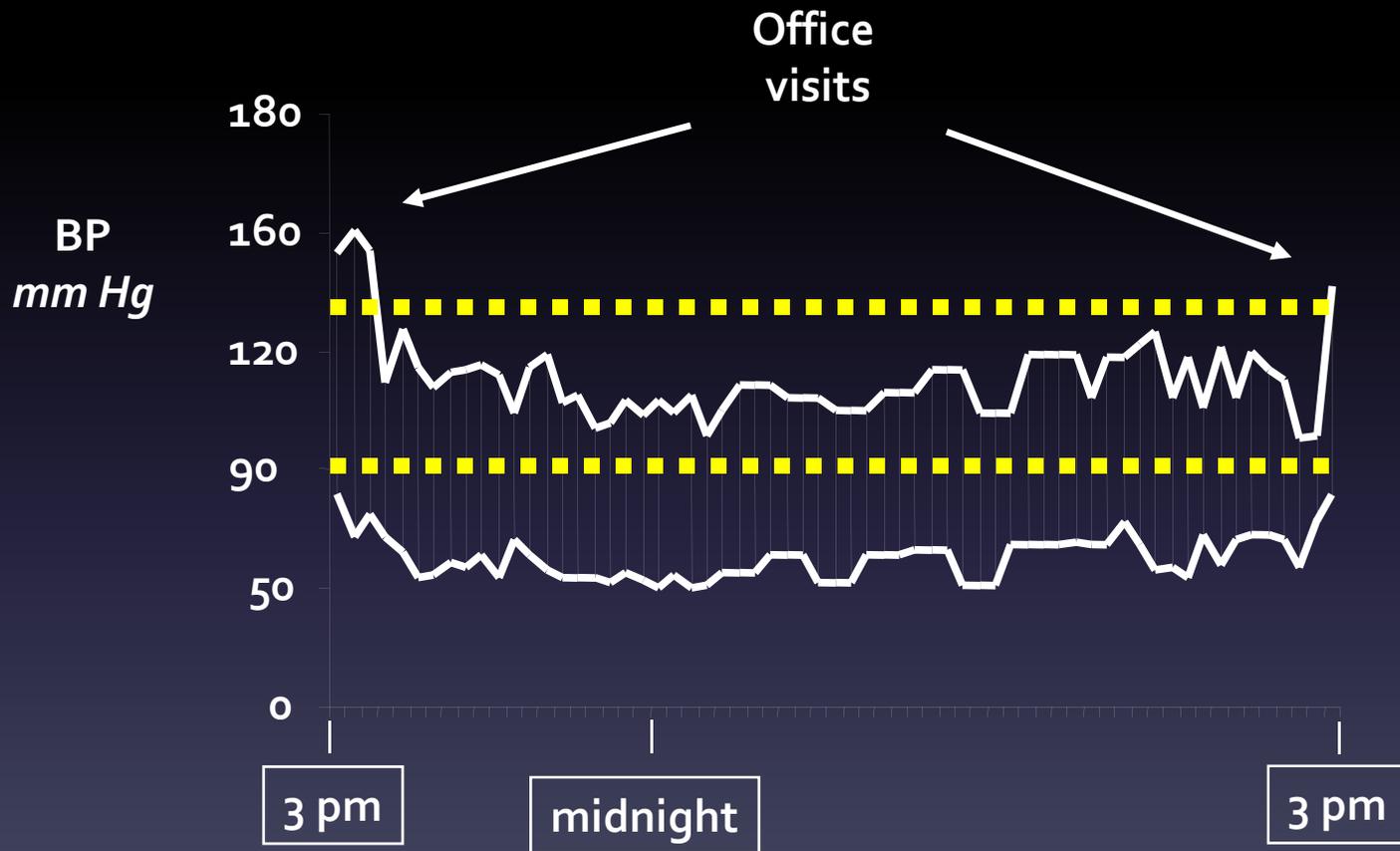
Synonyms: white coat normotension; reverse white coat hypertension; undetected ambulatory hypertension

Normotensive by clinic measurement and hypertensive by ambulatory measurement

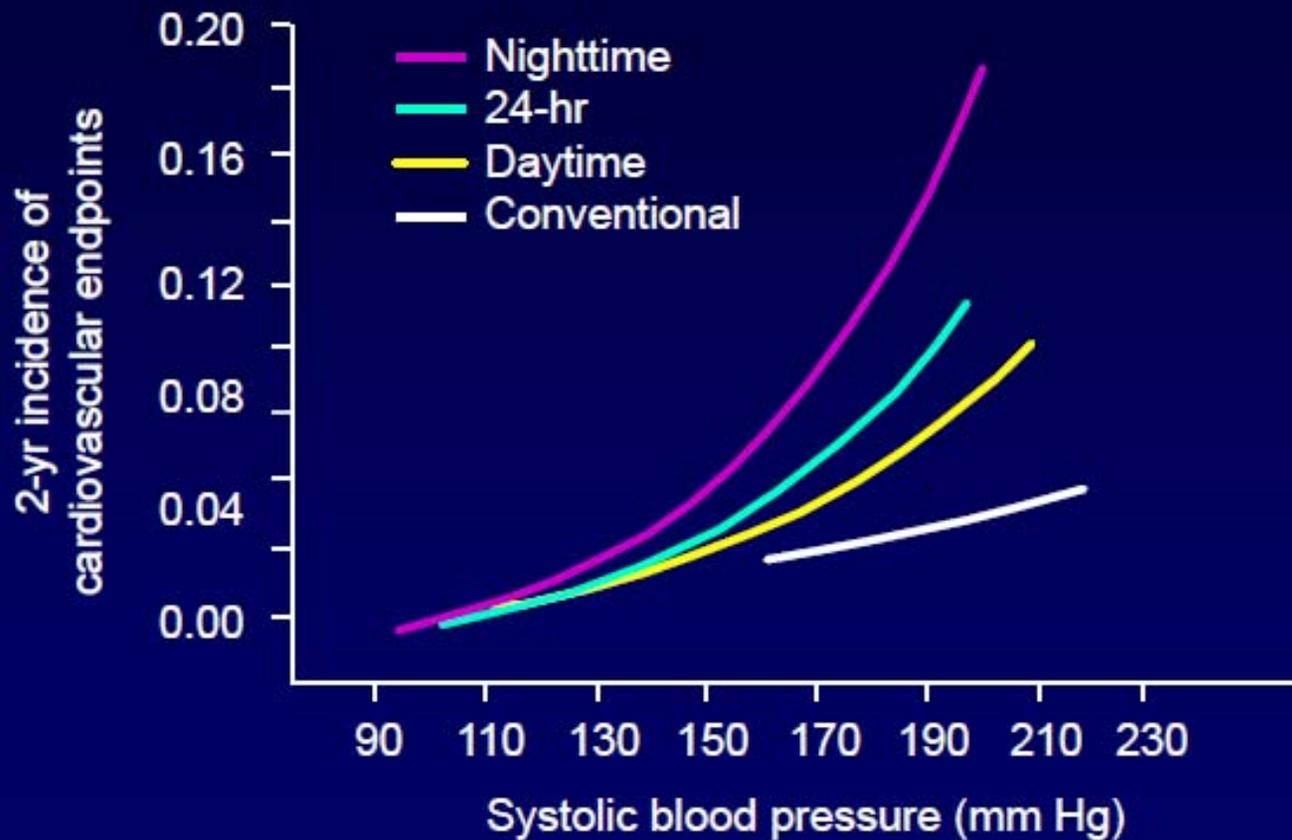
# White Coat Hypertension

- BP > 140/90 in the clinic, but < 135/85 by ABPM
- Present in ~20% of all patients with untreated HTN
- Significantly more prevalent in treated women than men

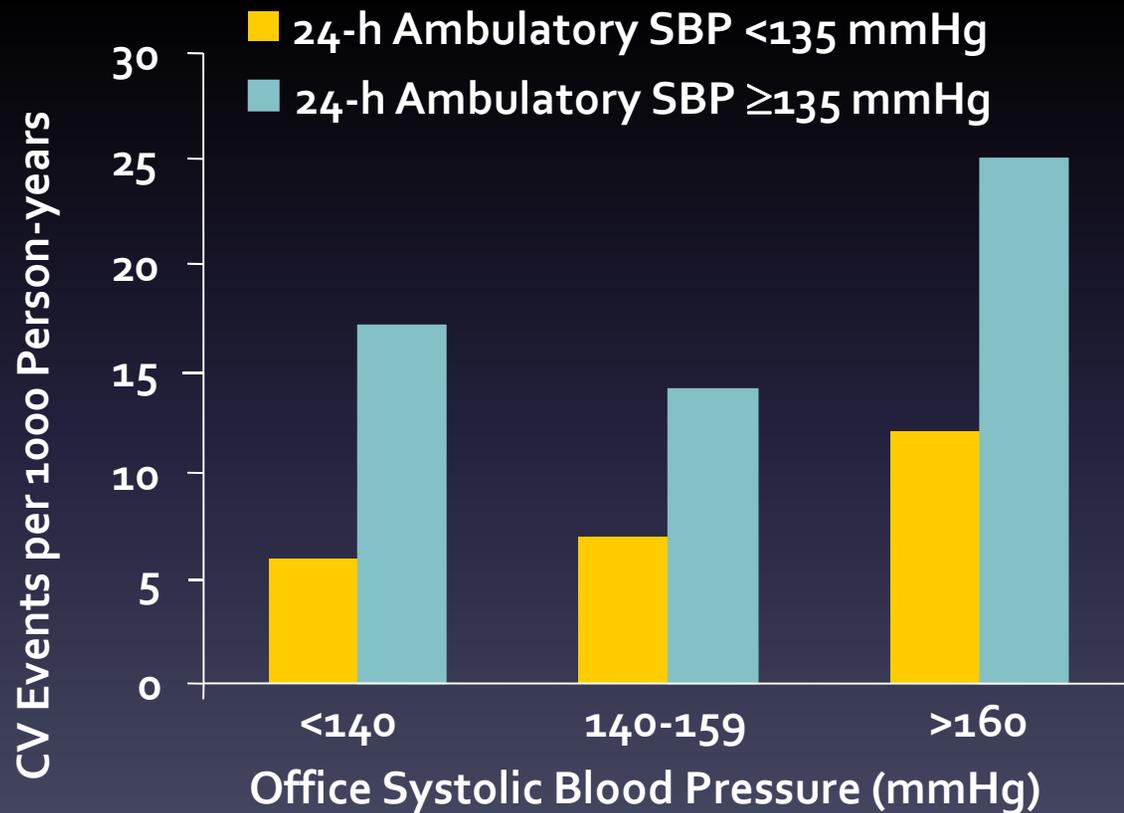
# White Coat Hypertension



# Conventional, 24-hr, Daytime and Night-time SBP as Predictors of Cardiovascular Endpoints – Syst-Eur



# Incidence of CV Events According to Office Systolic Blood Pressure



Clement DL, et al. *N Engl J Med.* 2003;348:2407-2408.

# Limitations of Office BP

- Poor quality control due to technique
  - Cuff size
  - Patient position (e.g. feet not on floor, arm not at heart level)
  - Failure to allow 5 minutes rest
  - Letting air out of cuff too rapidly
  - Digit bias (rounding to nearest 5 or 10 mmHg)
  - Expectation bias

# Ambulatory Blood Pressure Monitoring

1. Using ambulatory blood pressure monitoring (ABPM) in practice & research
2. Advantages/disadvantages of ABPM
3. Combining office BP with ABPM
4. Barriers to the use of ABPM in clinical practice
5. Home BP monitoring as another strategy

# ABPM in Clinical Practice

- Assessment of possible white-coat effect (only indication currently reimbursable by Medicare)
- Other clinical indications
  - Confirm hypertension in children
  - Symptoms with hypertension
  - Resistant hypertension
    - Up to a third of such patients have controlled ABPM
  - Labile hypertension
  - Hypotensive episodes
  - Postural hypotension/Autonomic Dysfunction

# Suggested Values for the Upper Limit of Normal Ambulatory Pressure

	Optimal	Normal	Abnormal
Daytime	<130/80	<135/85	>140/90
Nighttime	<115/65	<120/70	>125/75
24-hr	<125/75	<130/80	>135/85

# Ambulatory BP monitoring

- Nurse or MA provides instructions and fits the monitor
  - Instructions include not to remove the cuff, to avoid strenuous activity, to try to relax arm when device is taking a reading
- Person wears monitor (usually) 24-hours
- Programmed for automatic readings at desired intervals (e.g., every 30 minutes)

# Ambulatory Blood Pressure Units

## Modern ABPM Units Provide Ease of Use

1



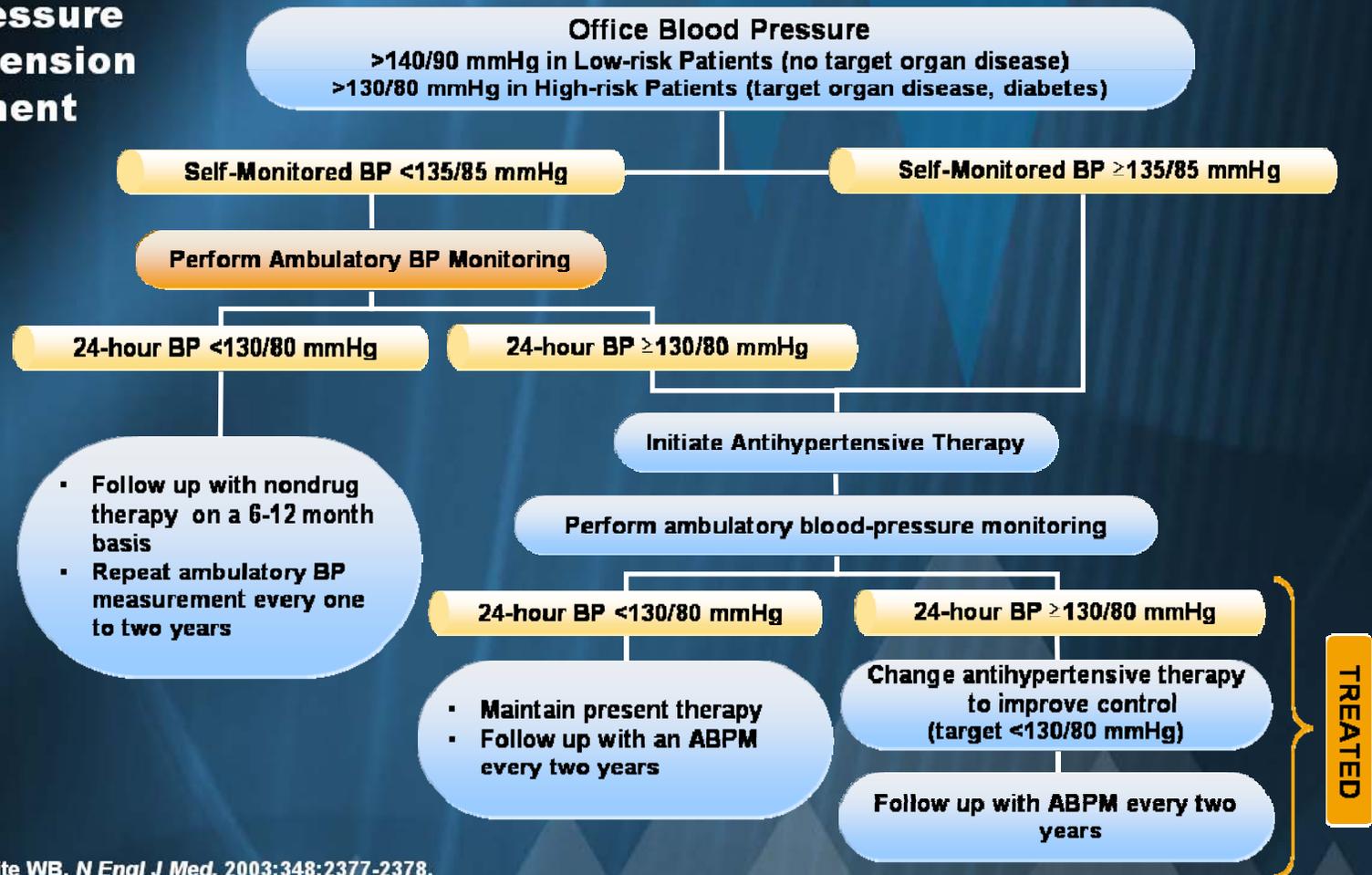
2



1. Photo provided by Spacelabs Medical, Inc.
2. Photo provided by Suntech Medical, Inc.

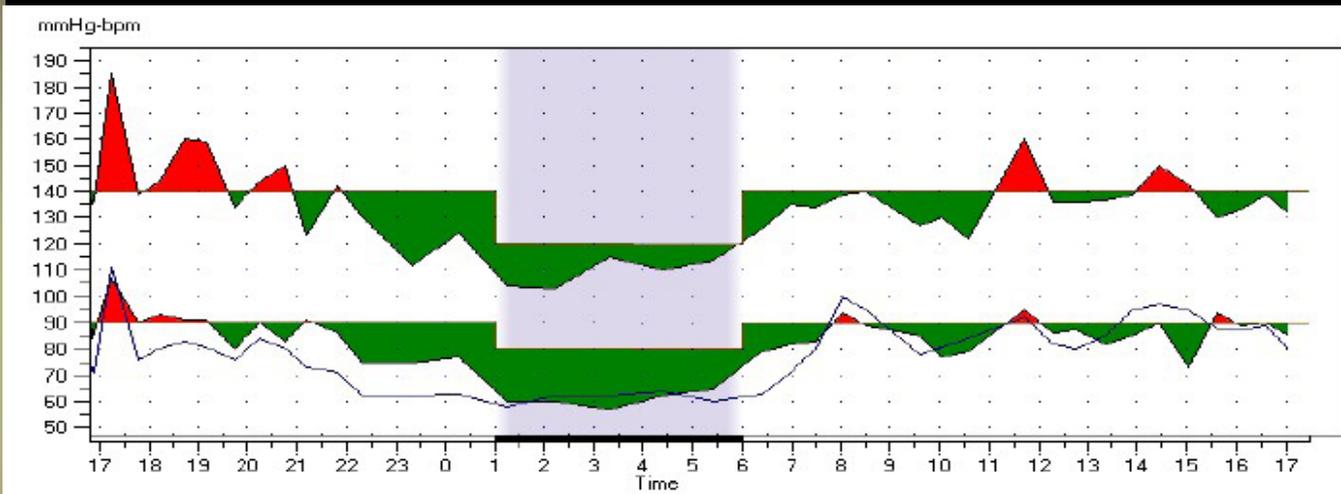
# Ambulatory Blood Pressure Algorithm

## Use of Ambulatory Blood Pressure in Hypertension Management



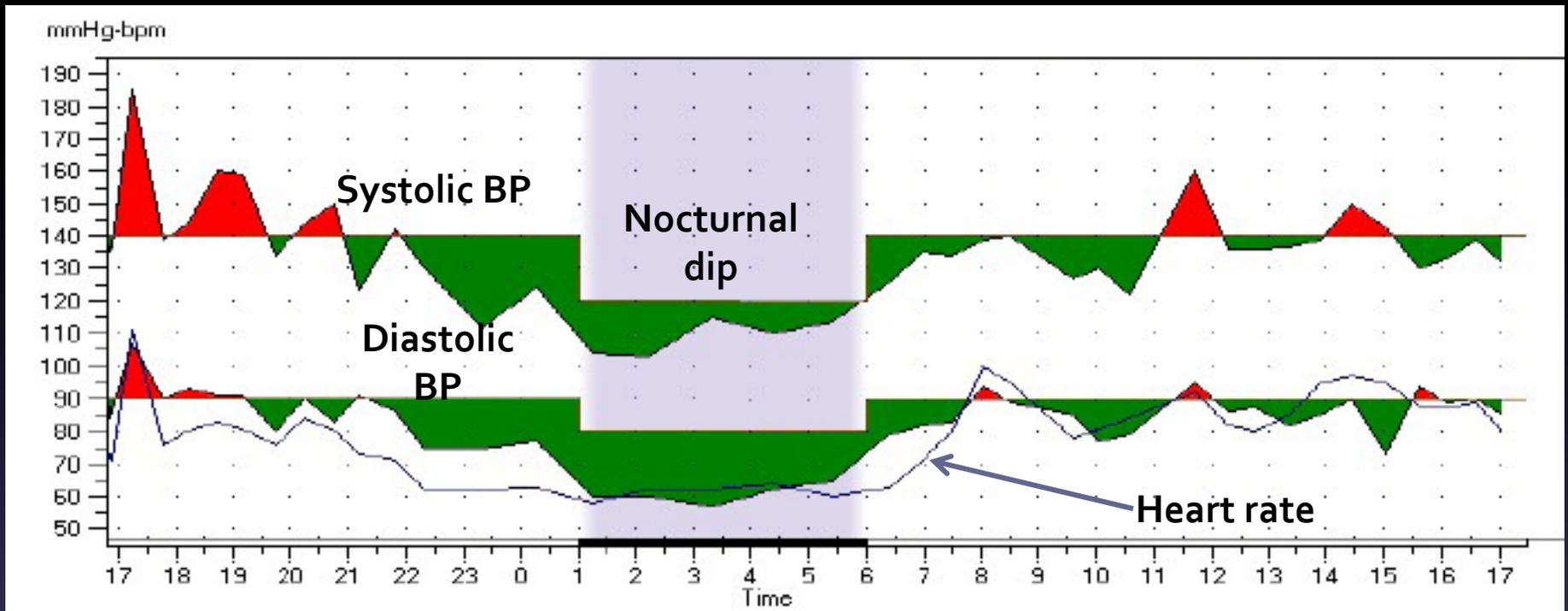
Adapted from White WB. *N Engl J Med.* 2003;348:2377-2378.

# Ambulatory BP monitoring



Data transferred to a computer using a USB cable and the device's software; interpretation entered & report generated

# ABPM Graph of Data



“White coat” period

Awake period

*Sleep time period*

Awake period

# Ambulatory BP Data

- Average ambulatory BP (i.e. “true” BP)
- Diurnal rhythm of BP
  - Nocturnal BP
  - Nocturnal dipping
  - Morning surge
  - Masked nocturnal hypertension
- Blood pressure variability

# Barriers to ABPM in Clinical Practice

- Few providers trained
- Not widely available
- Poor reimbursement
- Patient tolerability

# Out-of-Office Blood Pressure Measurement

- Provides a better risk prediction than office-based monitoring
- Correlates better with the cardiac (LVH) and renal (albuminuria) consequences of hypertension than office readings
- Use and Advantages:
  - Helps identify WCH and masked hypertension
  - Multiple readings throughout the day may reveal patterns in blood pressure and periods when control is inadequate
  - Improves patient adherence
  - Reduced costs



# Out-of-Office Monitoring Confirms or Refutes Diagnosis

		Ambulatory BP	
		HTN	“Normal”
Office BP	HTN	“Sustained HTN”	White Coat HTN (“false +”)
	“Normal”	Masked HTN (“false –”)	“True Normal”

# ABPM in Research

- “Gold standard” for BP assessment
  - White-coat and masked HTN studies
- Studies of BP-lowering drugs
- Chronotherapy studies
- Studies of drugs not intended to have BP effect (off-target BP response)\*

\*Sager et al. Assessment of drug-induced increases in blood pressure during drug development: report from the Cardiac Safety Research Consortium. Am Heart J. 2013 Apr;165(4):477-88.

# ABPM Summary

- ABPM is a valuable component of modern hypertension management
- ABPM is not yet widely available
- ABPM should be the preferred method of BP assessment in research studies
- HBPM may be more feasible for managing hypertensive patients but it has several limitations as well

# Home BP Monitoring

- May be a more feasible method
- Widely available
- Relatively affordable (or could be loaned)
- Systematically performed, home BP averages correlate (reasonably) with daytime ABP average

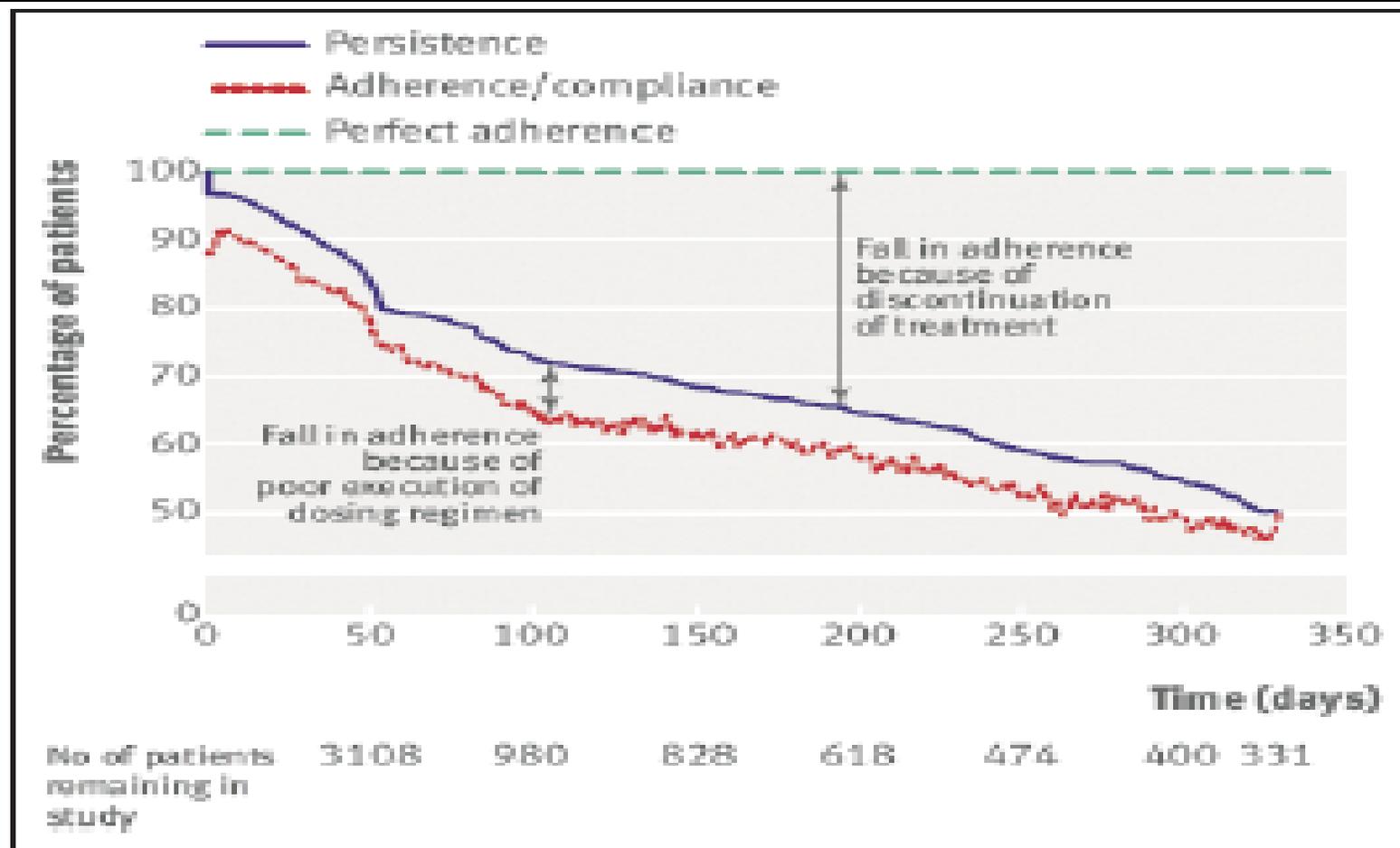
# Home BP Monitoring Problems

- Still relies on proper technique
- Dependent on patient effort / engagement
- Concerns over “trustworthiness” of data
- Still misses large segments of day (and nocturnal)

# Real World Approach to Medication Adherence

- How do you know if your patient is taking their medications?
- How do you know how often your patient is taking their medications?
- How do you get your patients to take their medications regularly?
- What tools are available to help?

# At One Year As Many As 50% of Patients May Not Be Fully Adherent



# Potential Strategies to Improve Adherence

- Fixed dose combinations
- Once daily medications
- Self monitoring of BP
- Team interventions
  - Particularly use of clinical pharmacist as part of care team

- Fill reports from pharmacy
- Customized blister packs
- Pill boxes
- Reduced out of pocket for 'essential' medications
- Refill reminders
- Improve communication

# Phone Applications to Improve Lifestyle Weight & Heart Health Eating

- Patients enter daily food intake and exercise
- Apps tally up quantity
- Provide objective data
- Beneficial to target goals of
  - Reduced saturated fat and sodium
  - Increased potassium and fiber
  - Increased exercise

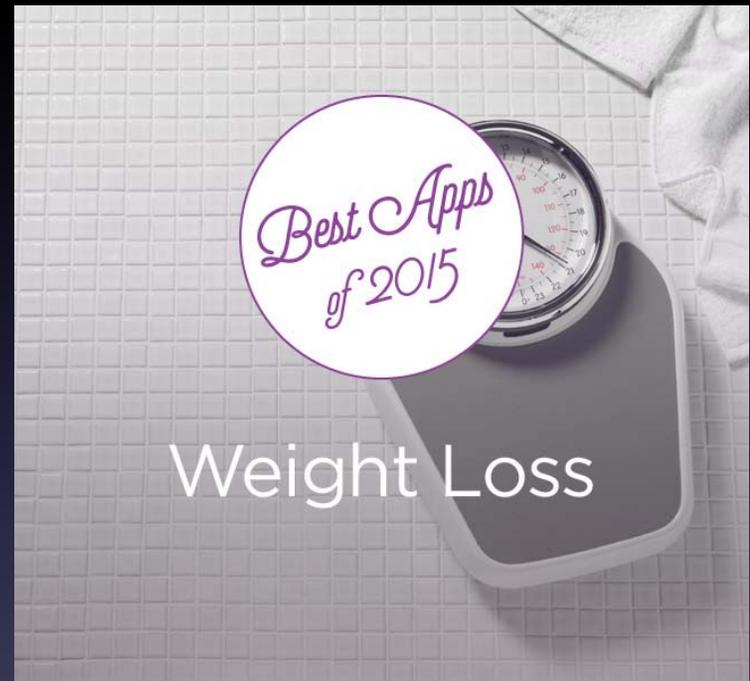
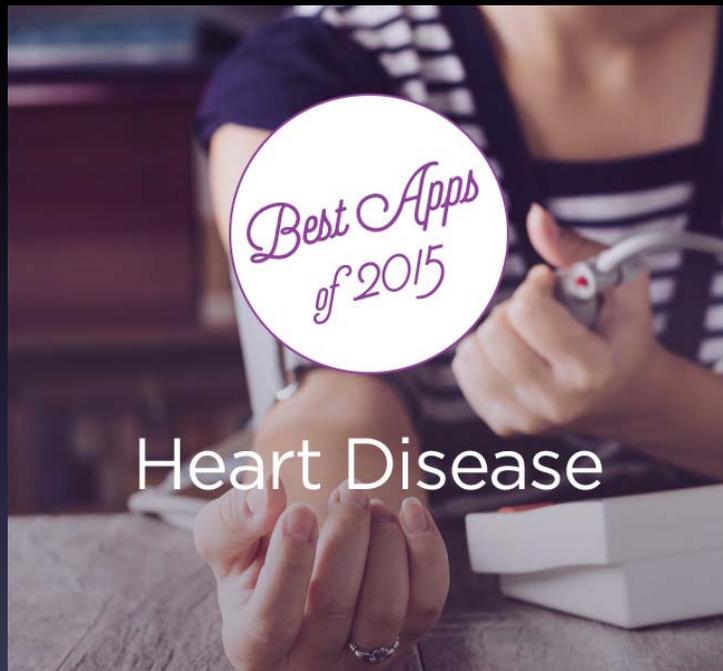
- MyNetDiary  
[www.mynetdiary.com](http://www.mynetdiary.com)
- MyFitnessPal  
[www.myfitnesspal.com](http://www.myfitnesspal.com)
- Lose it!  
[www.loseit.com](http://www.loseit.com)
- Noom Coach  
[www.noom.com](http://www.noom.com)

# Phone Applications for Blood Pressure & Exercise

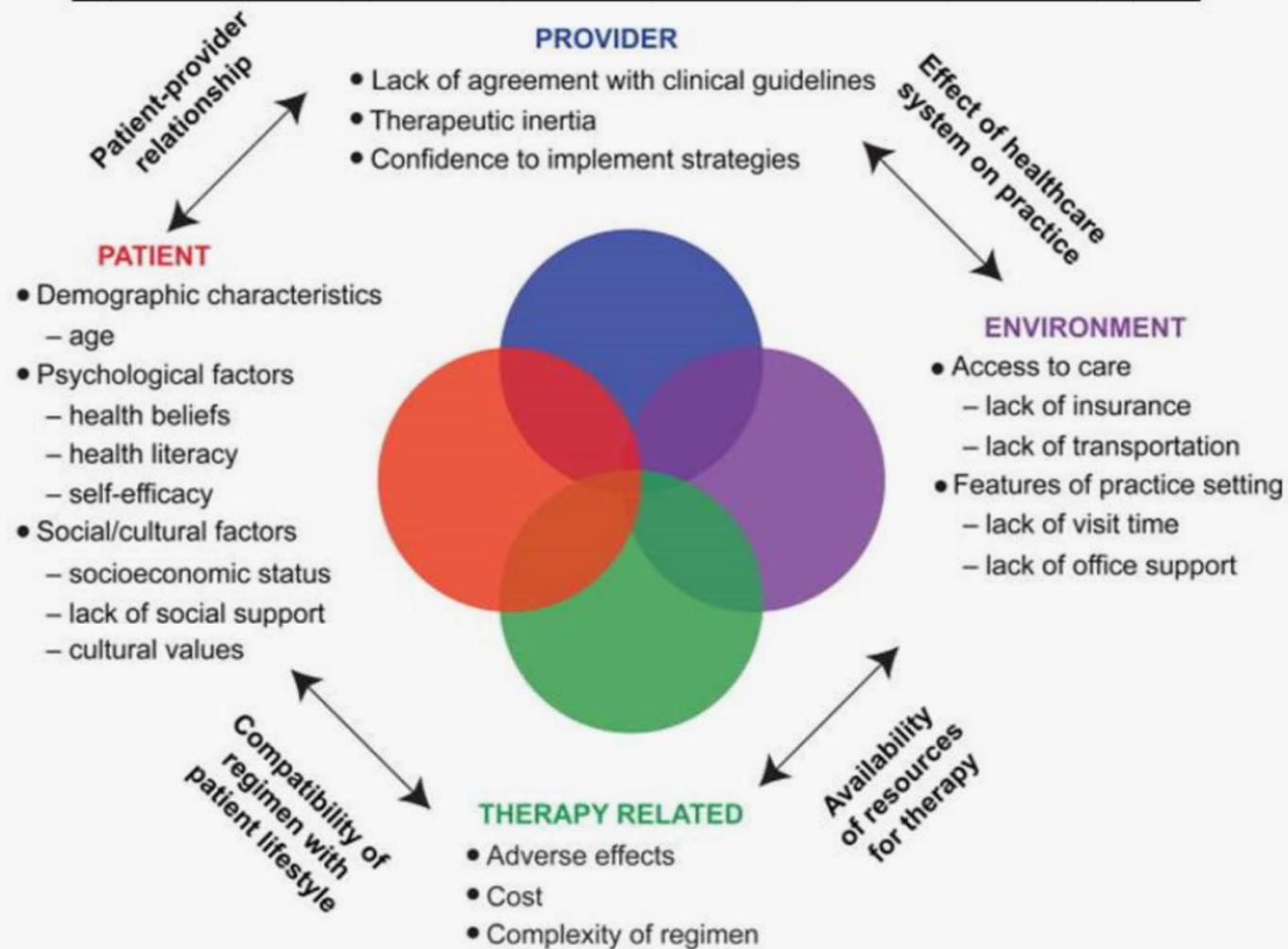
- Track patients blood pressure over time with options to email reports to medical staff
- Provide visual graphs
- Patients have the ability to enter and track medications
- Encourage doable workouts of 20-30 minutes of activity three times a week
- Measure time and distance of walk, run, or ride

- Withings
- HeartWise (SwEng LLC)
- BP Monitor (Taconic Systems)
- Runkeeper  
[www.runkeeper.com](http://www.runkeeper.com)
- JogTracker  
[www.jogtracker.com](http://www.jogtracker.com)
- Couch to 5k  
[www.activenetwork.com](http://www.activenetwork.com)

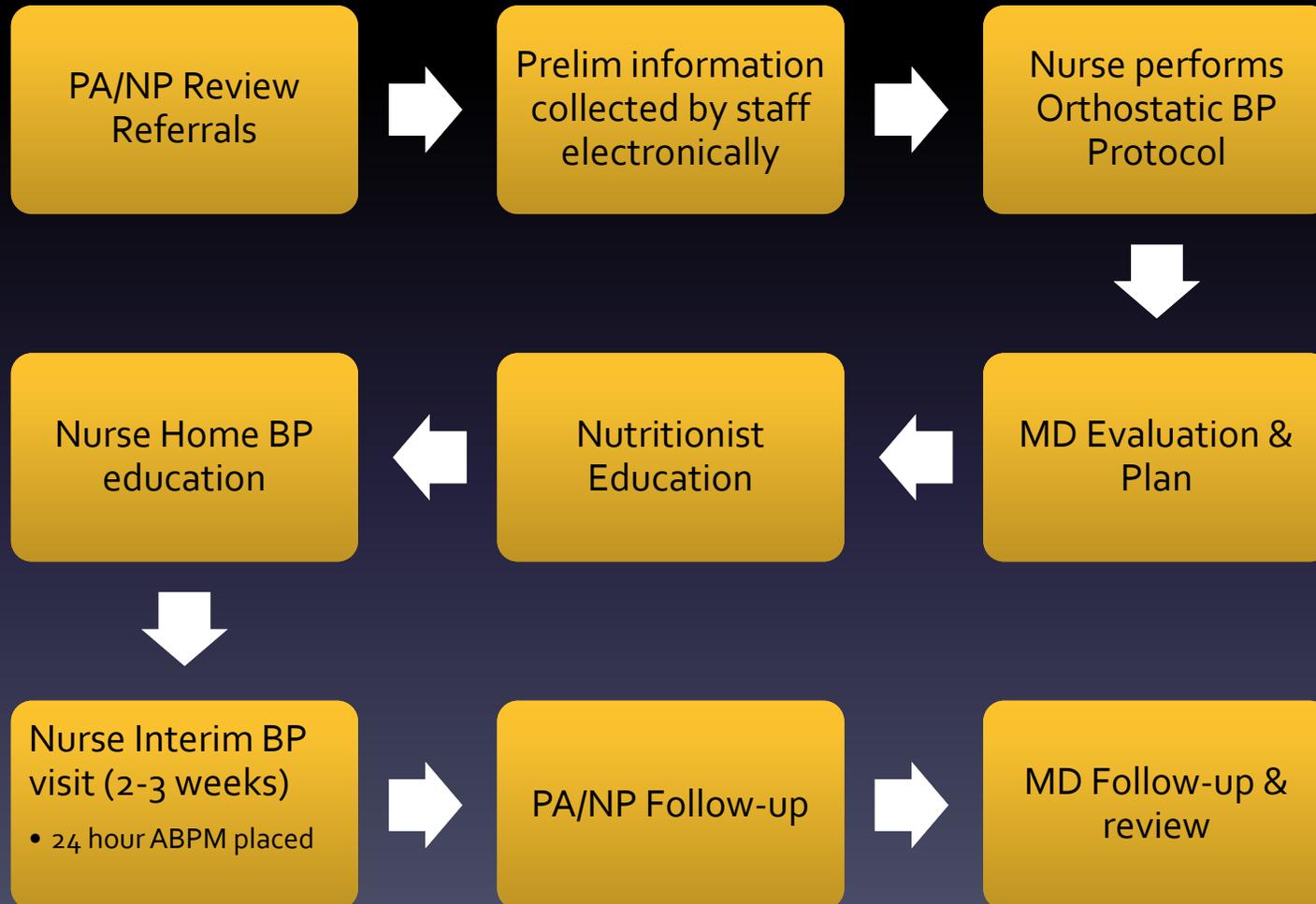
# Application Resource



# Barriers to Blood Pressure Control Lifestyle Modification and Drug Treatment

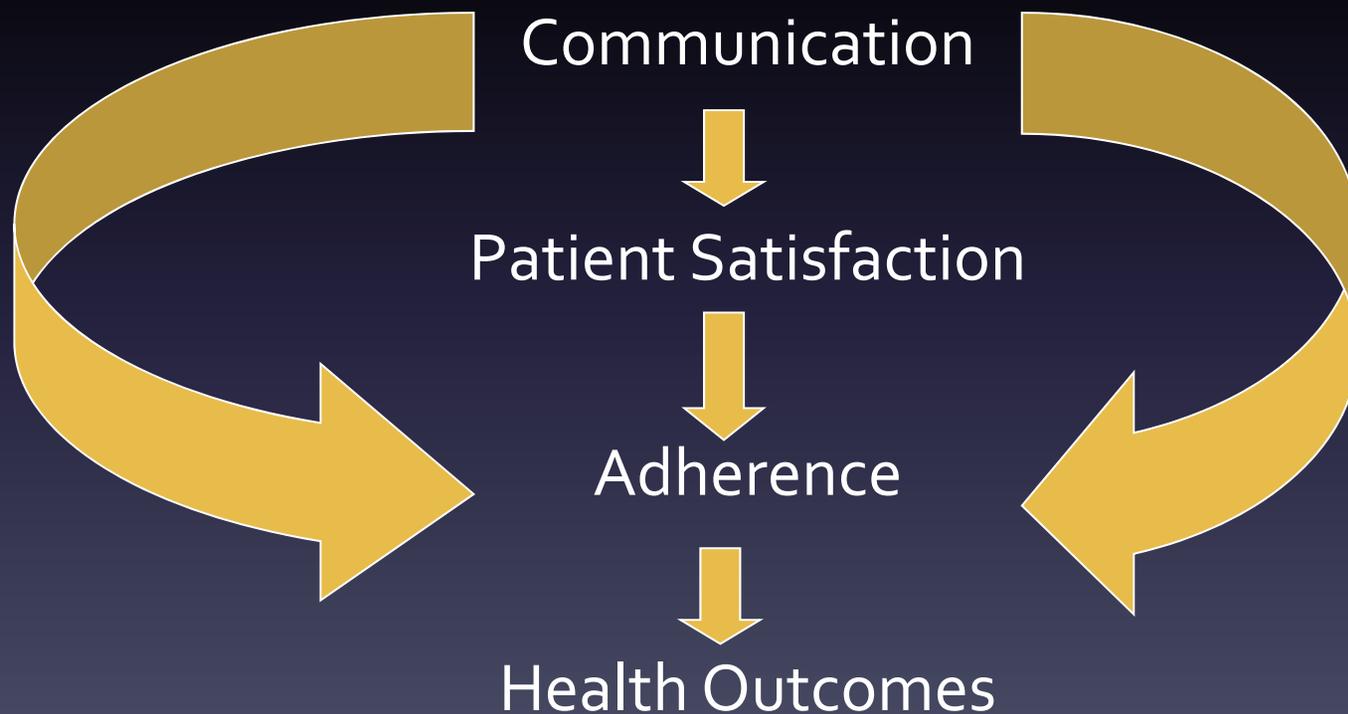


# Interdisciplinary HTN Clinic Model



# Linking Communication and Adherence

How do we link communication to outcomes?



# A Patient-Based Approach to Communication:

- Explanatory Model
- Social Risk for Noncompliance
- Fears/Concerns about the Medication
- Therapeutic Contracting/Playback

\* Hypertension in Multicultural and Minority Populations: Linking Communication to Compliance.  
Betancourt JR, Carrillo JE, Green AR. Current Hypertension Reports. 1999; 1:482-488

# Exploring the Explanatory Model

1. What does it mean for you to have *hypertension*?
2. Do you know why I think it is important for you to take your BP medications?
3. Do you know about the risk of stroke with HTN
4. What treatments do you think work for your hypertension? Anything besides the medication?

# Determining Social Risk for Non-adherence

1. Does your insurance cover your medications?
2. How difficult to afford are your medications or copayments?
3. Where do you get your medication?
4. Do you simply forget to take your medications?
5. Are there family members who can help with your medications (and are you interested in that)?
6. How are your medications organized at home? Pill box?

# Determining Fears and Concerns about Medications

1. How do you feel about taking this medication?
2. What have you heard about this medication?
3. What worries do you have about side effects?
4. What concerns do you have about the:
  - Dosage?
  - Size of pill?
  - Color of pill?

# Therapeutic Contracting

Taking medications for (hypertension) can be difficult...

1. Can we come to an agreement about at how you will take your medications until next visit?
2. Playback

# Multi-Factorial Interventions

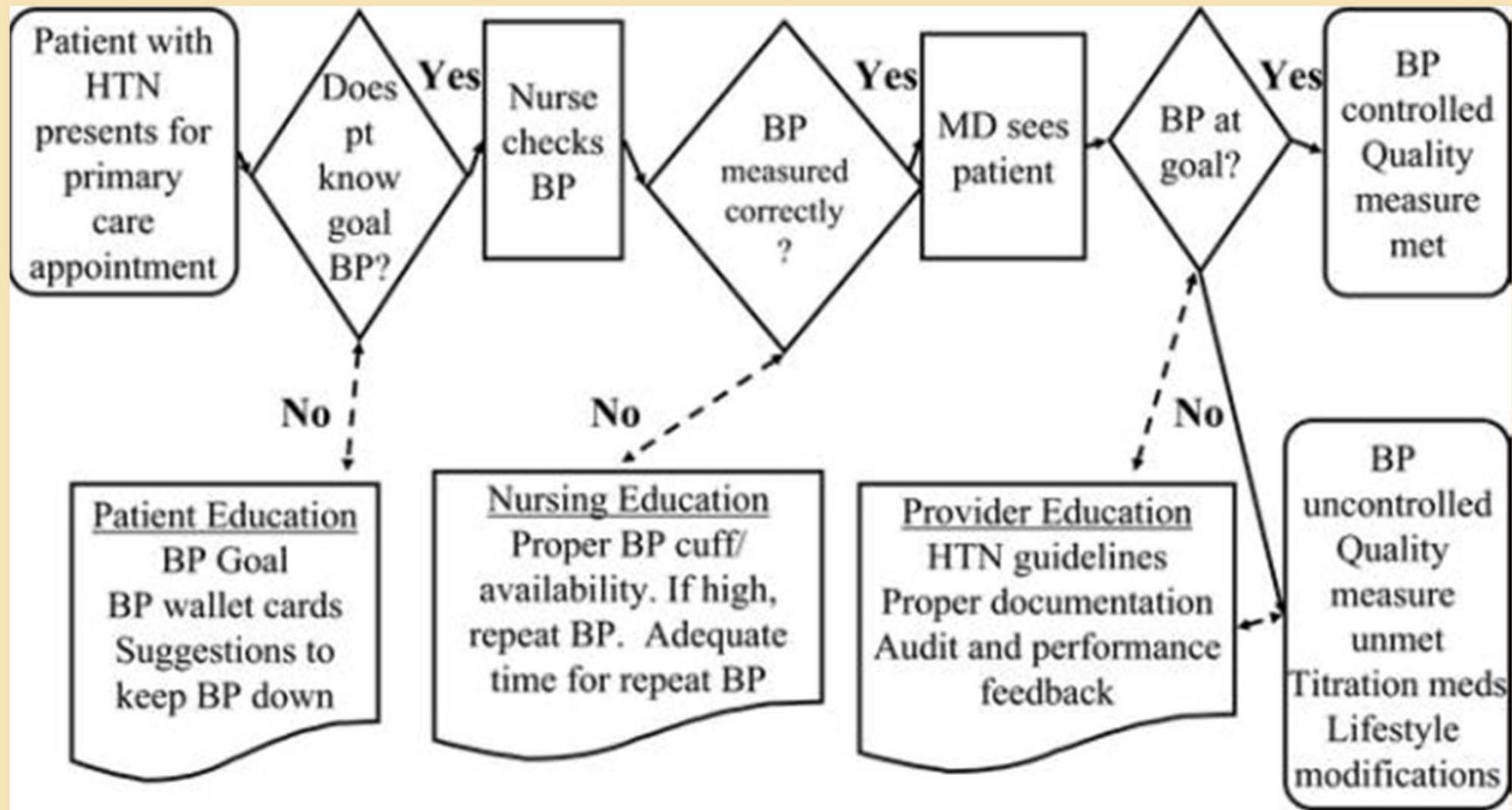


Figure 1. Current process map of hypertension treatment and proposed interventions.

**Quality Improvement Initiatives Improve Hypertension Care Among Veterans.**

Choma, N et.al Circulation: Cardiovascular Quality & Outcomes. 2(4):392-398, July 2009.

Questions?

A hand-drawn underline in black ink is positioned below the word "Questions?". The underline is a simple, slightly curved line. To the right of the underline, the tip of a black marker is visible, pointing towards the end of the underline. The marker has the word "Carte" printed on its side.