CARDI·OH

Ohio Cardiovascular Health Collaborative

SCHOOL OF MEDICINE
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Cardi-OH ECHO Reducing the Burden of Hypertension

Thursday, January 23, 2020

Disclosure Statements

The following planners, speakers, moderators, and/or panelists of the CME activity have financial relationships with commercial interests to disclose:

- Adam T. Perzynski, PhD reports being co-founder of Global Health Metrics LLC, a Cleveland-based software company and royalty agreements for forthcoming books with Springer publishing and Taylor Francis publishing.
- Brian Bachelder, MD received funds for his role as Physician Advisor at VaxCare.
- SiranM. Koroukian, PhD received grant funds for her role as a subcontractor on a study funded by Celgene.
- Christopher A. Taylor, PhD, RDN, LD, FAND reports grant funding and travel support for his role as a consultant, researcher, and presenter for Abbott Nutrition, and is also a member of the Scientific Advisory Council of Viocare, Inc.
- Jackson T. Wright, Jr., MD, PhD reports research support from the NIH and Ohio Department of Medicaid and consulting with NIH, AHA, and ACC.
- These financial relationships are outside the presented work.

All other planners, speakers, moderators, and/or panelists of the CME activity have no financial relationships with commercial interests to disclose.

Overview of undiagnosed (masked) hypertension

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Objectives

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- Provide an overview of the prevalence and impact of masked hypertension (MH) on cardiovascular outcomes.
- Summarize the risk factors and diagnostic evaluation for MH.
- Recognize treatment implications in patients with MH.

Significance of Out of Office BP Readings

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- A major reason is to identify patients on no antihypertensive medication with:
  - White Coat Hypertension (WCH) with elevated office BPs who may not require drug treatment
  - Masked Hypertension (MH) with normal office readings who should be considered for drug treatment
- In addition, in those on antihypertensive medications, to identify
  - White Coat Effect (WCE) – where office BPs are significantly higher than out of office readings
  - Masked Uncontrolled Hypertension (MUCH) – where office readings indicate adequate BP control but out of office readings are elevated

White Coat Hypertension (WCH) and Masked Hypertension (MH)

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- The prevalence of WCH and MH is between 10-30% each depending on the study
- The risk of cardiovascular morbidity and mortality for MH is about the same as adults with sustained hypertension, indicating a benefit to treatment
- While there appears to be an increased risk of cardiovascular morbidity with MH, we do not know if there is a benefit to treating these individuals
- *In essence*: *Up to 30% of patients in our practices are either over or under-treated for hypertension*

2017 ACC/AHA/AAPA/ABC/ACPM/AGS/APhA/ASH/ASPC/NMA/PCNA Guideline for the Prevention, Detection, Evaluation, and Management of High Blood Pressure in Adults. A Report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines. Whelton and colleagues.
http://www.onlinejacc.org/content/accj/71/19/2199.full.pdf

Characteristics of Masked Hypertension (MH)

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- MH prevalence also averages ~ 13% and up to 30% in some surveys
- Prevalence increases with higher (normal) office readings
- Increased prevalence of MH also seen in older persons, males, Blacks, and those with obesity, diabetes, CKD, and sleep apnea
- Large longitudinal cohort studies show CVD risk similar to that for sustained hypertension
- Overlap between MH identified by HBPM and ABPM only 60-75% though both show same CVD risk compared to NTH and sustained HTN
- RCT data evaluating benefit of treatment not yet available
- Profiles of risk for treated patients showing MUCH parallel that of MH respectively

CVD and Mortality with Masked HTN vs Normotension

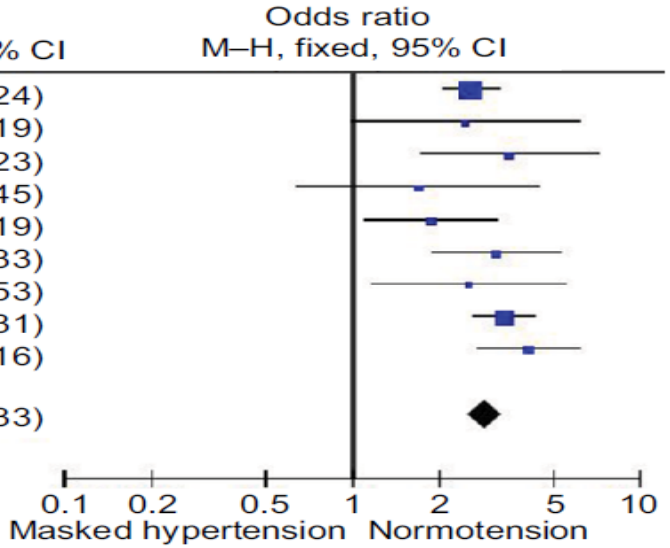
Palla M et al. Integr BP Control 2018; 11: 11-24

A

Composite cardiovascular events: masked HTN versus normotension

Study or subgroup	Masked hypertension Events	Total	Normotension Events	Total	Weight	Odds ratio M–H, fixed, 95% CI
Asayama et al[32]	149	1612	159	4176	38.1%	2.57 (2.04–3.24)
Björklund et al[27]	10	82	10	188	2.5%	2.47 (0.99–6.19)
Booth et al[7]	35	352	10	329	4.4%	3.52 (1.71–7.23)
Fagard et al[28]	7	31	20	136	2.7%	1.69 (0.64–4.45)
Hansen et al[30]	21	211	48	859	8.1%	1.87 (1.09–3.19)
Mancia et al[29]	25	184	43	909	5.9%	3.17 (1.88–5.33)
Pierdomenico et al[31]	11	120	18	471	3.1%	2.54 (1.17–5.53)
Stergiou et al[16]	119	636	211	3312	26.2%	3.38 (2.65–4.31)
Tientcheu et al[6]	53	256	52	865	8.9%	4.08 (2.70–6.16)
Total (95% CI)		3484		11245	100.0%	2.91 (2.54–3.33)
Total events	430		571			

Heterogeneity: χ^2=9.59, *df*=8 (*P*=0.29); I^2=17%
Test for overall effect: *Z*=15.46 (*P*<0.00001)



B

Mortality: masked HTN versus normotension

Study or subgroup	Masked hypertension Events	Total	Normotension Events	Total	Weight	Odds ratio M–H, fixed, 95% CI
Booth et al[7]	29	385	15	353	14.0%	1.84 (0.97–3.48)
Mancia et al[29]	25	184	43	909	12.1%	3.17 (1.88–5.33)
Stergiou et al[16]	136	636	301	3312	73.9%	2.72 (2.18–3.40)
Total (95% CI)		1205		4574	100.0%	2.65 (2.18–3.23)
Total events	190		359			

Heterogeneity: χ^2=1.76, *df*=2 (*P*=0.41); I^2=0%
Test for overall effect: *Z*=9.67 (*P*<0.00001)

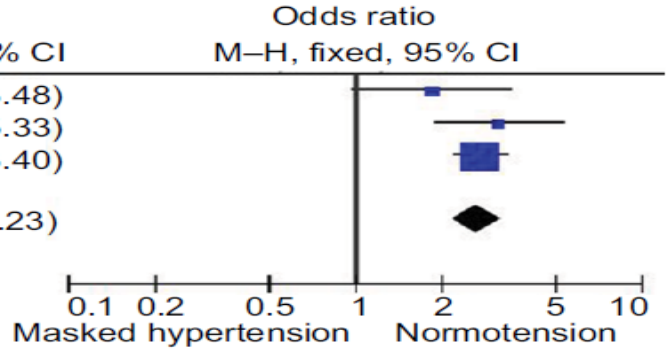


Figure 1 Masked HTN versus normotension – whole cohort.
Notes: (**A**) Composite cardiovascular events. (**B**) All-cause mortality.
Abbreviations: CI, confidence interval; HTN, hypertension; M–H, Mantel–Haenszel.

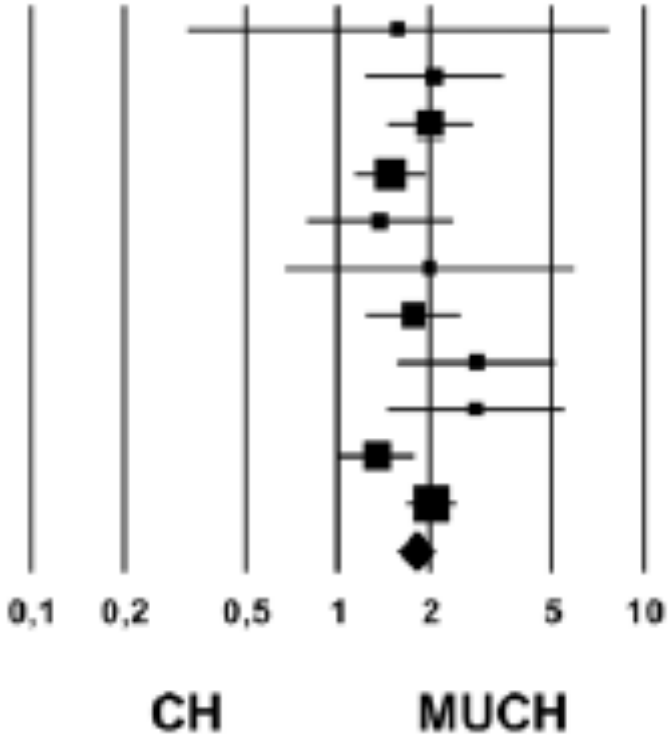
Comparison of Outcomes in Masked Uncontrolled (MUCH) vs Controlled Hypertension

Pierdomenico SD et al. Hypertens 2018; 72:862-869

Study name	Hazard ratio	Lower limit	Upper limit	Z-Value	p-Value
OvA Study 2003	1,570	0,321	7,681	0,557	0,578
SHEAF Study 2004	2,060	1,221	3,474	2,710	0,007
Chieti-Pescara Study 2005-2017	2,010	1,449	2,788	4,181	0,000
IDACO Study 2005-2017	1,490	1,142	1,944	2,940	0,003
Hadassah Study 2006	1,375	0,787	2,400	1,120	0,263
J-HEALTH Study 2008	2,000	0,669	5,975	1,241	0,214
IDHOCO Study 2014	1,760	1,227	2,524	3,073	0,002
Dallas Heart Study 2015	2,845	1,566	5,167	3,434	0,001
Jackson Heart Study 2016	2,820	1,443	5,511	3,033	0,002
HONEST Study 2017	1,345	1,005	1,800	1,995	0,046
Spanish Registry Study 2018	2,030	1,669	2,469	7,091	0,000
Overall	1,796	1,566	2,061	8,371	0,000

Statistics for each study

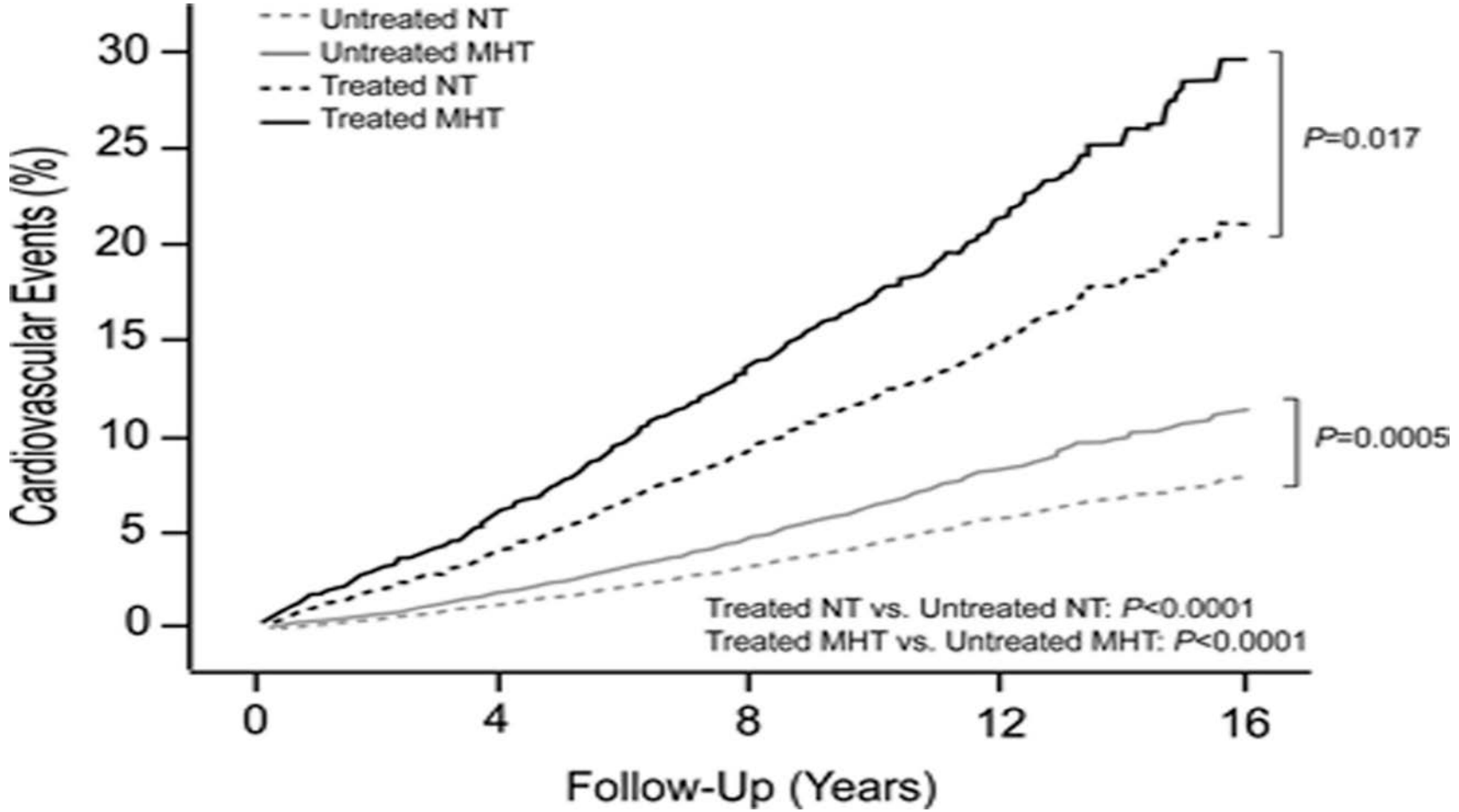
Hazard ratio and 95% CI



Q = 12,9 P = 0,2
I squared = 22,5
Tau squared = 0,01

Meta Analysis

Cohort, sex, and age-standardized incidence of cardiovascular events in untreated and treated normotensive (NT) and masked hypertensive (MHT) nondiabetic subjects that are derived from an IDACO (International Database on Ambulatory Blood Pressure in Relation to Cardiovascular Outcomes) meta-analysis.[17] Fully adjusted hazard ratios (HRs) for treated vs untreated masked hypertensives are as follows: HR, 2.27 (95% confidence interval, 1.6–3.2; P<0.0001).



Masked HTN by ABPM and HBPM

Anstey DE et.al. HTN 2018; 72: 1200-1207

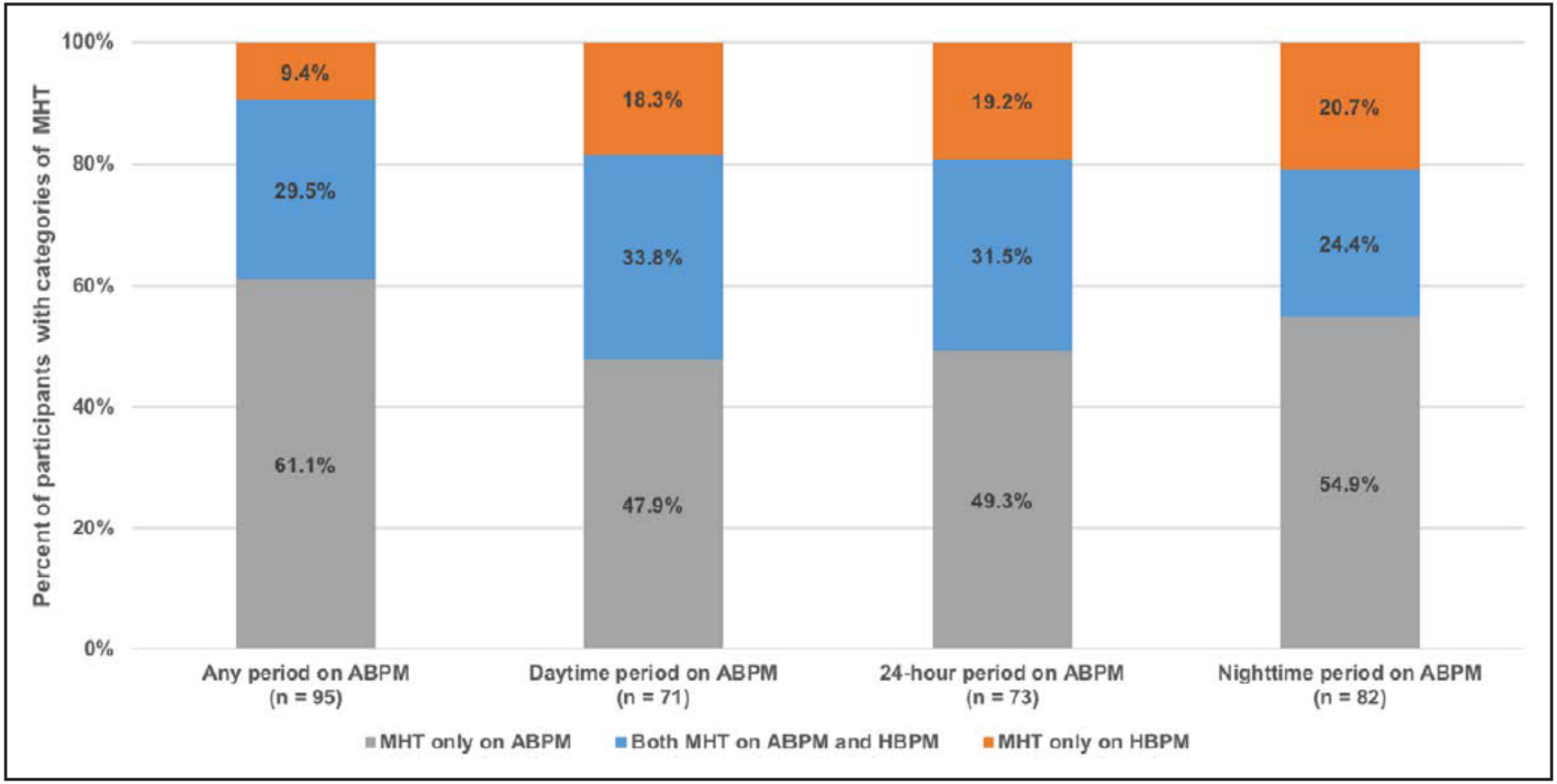
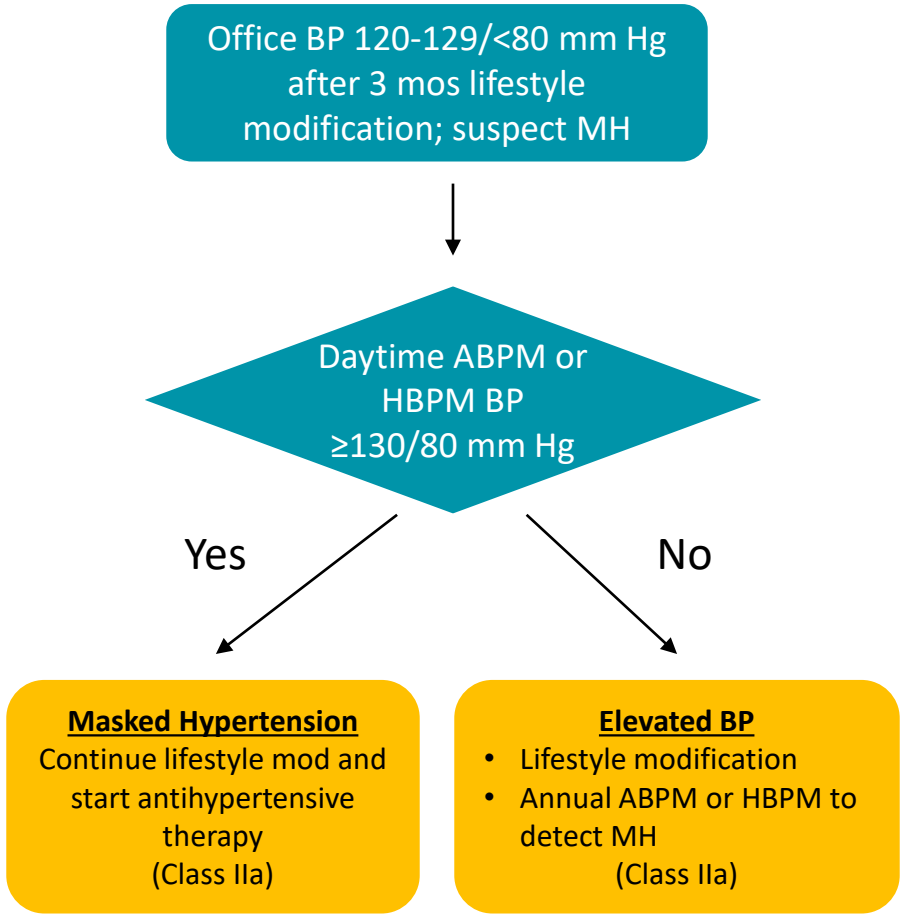


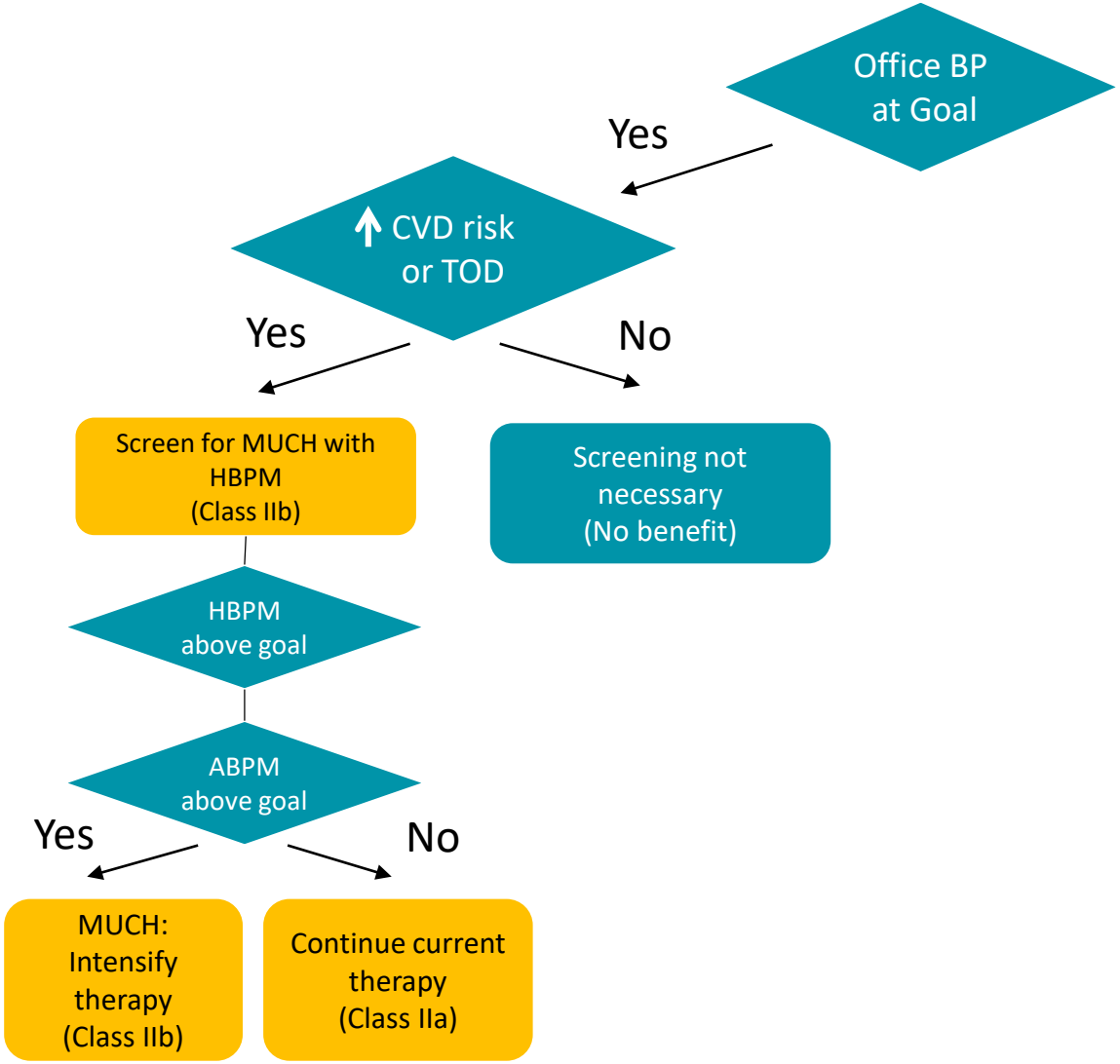
Figure. Distribution of participants into categories based on the absence or presence of masked hypertension (MHT) on ambulatory blood pressure monitoring (ABPM) and home blood pressure monitoring (HBPM).

Detection of Masked Hypertension in Patients not on Drug Therapy



ABPM: ambulatory BP monitoring; HBPM: home BP monitoring

Detection of Masked Uncontrolled Hypertension in Patients *on* Drug Therapy



Summary/Conclusions

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- MH prevalence also averages ~ 13% and up to 30% in some surveys
- Prevalence of MH increases with higher (normal) office readings
- Increased prevalence of MH also seen in older persons, males, Blacks, and those with obesity, diabetes, CKD, and sleep apnea
- Large longitudinal cohort studies show CVD risk similar to that for sustained hypertension
- Overlap between MH identified by HBPM and ABPM only 60-75% though both show same CVD risk compared to NTH and sustained HTN
- Likely due to capability for nocturnal BP measurements, ABPM more sensitive than HBPM for detecting MH
- RCT data evaluating benefit of treatment not yet available
- Profiles of risk for treated patients showing MUCH parallel that of MH respectively

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Thank you!

Questions/Discussion