Treating Hypertension in 2019: What are the Goals / How do We Get There?

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### FACULTY DISCLOSURE

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USA Prevalence of Hypertension

JNC 7 Guidelines
Prevalence 31.9 % (controlled 61%)
Number of US Adults 72.2 Million

AHA / ACC Guidelines 2017
Prevalence 45.6 % (controlled 46.6 %)
Number of US Adults 103.3 Million
Categories of BP in Adults

Normal   BP   $< 120 / < 80$ mmHg

Elevated  BP   $120 -129 / < 80$ mmHg

Hypertension
Stage 1   BP   $130 -139 / 80 - 89$ mmHg
Stage 2   BP   $> 140 / 90$ mmHg

ACC/AHA Guidelines  Hypertension, Nov. 17 ,2017
Approach to Hypertension Therapy

After obtaining accurate BP

Stage I  BP  130 /80 to 139 /89 mmHg

evaluate underlying CVD Risk  (ACC Calculator)

a) if < 10% Risk =  Non-pharmacological RX
   ( 2 /3 of Patients )

b) if > 10% Risk = start  Drug Therapy
   ( 1 /3 of Patients )

Note: BP of 130 /80 to 139 /89 mmHg will
double Risk of Myocardial Infarction
BP Treatment Threshold and ASCVD Risk Estimation for Treatment

Drug and Lifestyle Therapy initiated in

1) Secondary Prevention in BP 130/80 or above
   a) clinical CVD or
   b) ASCVD 10 Year Risk of 10% or higher

2) Primary Prevention in BP 140/90 or above
   a) no History of CVD or
   b) ASCVD 10 Year Risk < 10%
Hypertension Met-Analysis 1966-2015

123 Trials (minimum 1,000 Patients / Trial)

Every SBP 10 mmHg Reduction > 140 mmHg lowers

- CHF 28%
- CVA 27%
- CAD 17%
- Mortality 13% (All Cause)

NO Benefit = ESRD
Lower Benefits = Diabetes and CKD

IDEAL SBP < 130 mmHg

Beta Blockers: inferior in CVA, CKD  Diuretics: superior in CHF
CCB: superior in CVA, inferior in CHF

Ettehad, D et. al. Lancet, 2016; 387:057
Cardiovascular Risk Reduction in Diabetes

Systolic BP lowering by 5 mmHg (from > 140) reduces CV Risk by ~ 12%

AIC lowering by 1% (from > 7.0%) reduces CV Risk by ~ 2.9%
(Microvascular Disease reduced by 37%)

DeFranzo, RA. et al. Diabetes Care 2017;41:813
SPRINT: SBP 121 vs. 136 mmHg

42% Reduction  CV Mortality
27% Reduction  All Cause Mortality
25% Reduction  MI, CVA, CHF
38% Reduction  CHF Admissions

No Outcome Difference between Groups with CKD (eGFR Loss of 50%), ESRD or CAD

The Sprint Research Group; NEJM, Nov. 9, 2015
How was BP obtained in SPRINT?

Patient seated in quiet room, no talking, automated OMRON (AOBP) preset 5 min waiting, obtain 3 Measurements

Unobserved SBP (no Attendant in Room)

\[ \text{AOBP} = \sim 8 - 15 \text{ mmHg LOWER SBP than "usual" Setting} \]

Myers MG, et.al Hypertension 2016; 68: 866
Comparing BP Measurement Techniques

6 Studies of MOBP vs. Research BP (AOBP) (2)
Difference ~ 9 / 6 mmHg (145 / 85 vs. 154 / 91 in Office)

9 Studies (2,696 Patients) comparing
AOBP vs. AABP = identical BP ~ 137 / 79 mmHg

Conclusion: AOBP = AABP = HMBP (1)

AOBP automated Office
AABP ambulatory awake
HBPM Home BP
MOBP manual Office

(1) Flack JM et.al. Am J Hypertension 2017;30 (1) 3
(2) Myers MG et.al Can Fam Physician 2014;60:127
Intensive SBP Control in T2D (ACCORD)

CV Event Risks

Intensive A1C (< 6.0 %) and Intensive SBP < 120 mmHg = No Benefit

Standard A1C 7.0- 7.9 % + Intensive SBP (< 130 mmHg) = 29 % Risk Reduction incl. CVA, CHF (HR 0.71)

Tsujimoto T et.al. Hypertension, 2018;72:323
New Onset CKD and SBP Control

ACCORD vs SPRINT

Intensive  10 %  3.5 %
Standard   4.1 %  1.0 %
(T2 Diabetes)  (No Diabetes)

Intensive SBP <120  Standard SBP <140 mmHg

Beddu S, Lancet Diabetes – Endo (on-line 4/18)
White Coat Hypertension (WCH)  
AHA / ACC 2017

Definition

SBP > 130 in Office, but < 130 mmHg at Home

1) Screen for WCH
   a) Office SBP > 130 but < 160 mmHg untreated
   b) on multiple Drugs, but
      SBP within 10 mmHg of Goal
   c) Home BP at Goal, but elevated BP in Office

2) Monitor WCH Patients periodically for
   Transition to Hypertension
HOME BP FACTS

1) 2:1 better Correlation of CV Events HOME vs. OFFICE BP

2) Diagnoses MASKED Hypertension

3) Home BP taken x 2/week for 48 weeks leads to
   4x More Likely Reaching BP GOAL
   (Kim J.et.al. JCH. 2010; 12: 253-260)

4) Diagnoses WHITE COAT Hypertension
   No Risk for CV Events or Mortality
   (Int. Database Home BP in CV Outcome, Hypertension 2014;63:675)

5) Better Correlation with Albuminuria
   (Fuchs SC et.al Curr. Cardiol Reports 2013; 14:413)

6) Hypertension needs Confirmation by HOME BP (US Task Force)
Masked Hypertension (AHA/ACC) 2017

Normal Office BP = but Home BP > 130/80 mmHg

Incidence 10-20%

1) Consider screening for Masked HTN
   b) Normal Office BP, but
      Target Organ Damage (LVH, CKD)
      High CVD Risk (>10% ASCVD)

2) Consider ABPM in high HBPM to confirm

Risk = 2 X CV Events vs. controlled BP
Choice of Medications
AHA / ACC 2017

Initiation of Therapy and first-line Drugs
Thiazides , CCB , ACEI or ARB’s

Stage I ( BP 130 -139 / 80 -89 mmHg )
start 1 Drug , titrate or add 2nd Drug

Stage II ( BP 140 / 90 mmHg and above )
BP Goal 20 / 10 mmHg above Target
start Combination Therapy
Choice of Medication with Comorbidities (AHA / ACC 2017)

Diabetes and CKD

Start Drug Therapy at 130 /80 mmHg with
Goal : < 130 /80 mmHg
First Line = HCTZ, CCB, ACEI or ARB
( UACR > 300 mg/g use ACEI or ARB )

Note: Beta –Blockers = NOT first Line, unless
CHF or IHD
No Atenolol ! ( inferior to other BB’s )
Bedtime Dosing in Diabetes or CKD (at least 1 BP drug at HS)

**DIABETES**

ABPM 48hrs: HTN present, if BP > 135 / 85 or Nocturnal BP > 120 / 70

448 patients on 3 drugs: using ONE Drug HS
follow up  5.4 years

Each 5 mmHg Nocturnal SBP Decline = 12 % Decline of CV Events
( CVA, MI, CV death )

**CKD** *

695 patients with eGFR < 60, 7 years follow up (ABPM 48hrs)

Each 5 mmHg Nocturnal SBP Decline = 14 % Decline of CV Events

Hermida, RC, et.al. Diabetes Care 2011; 134: 1270-1276
Racial and Ethnic Drug Choices

Black Adults without CKD or CHF, including those with Diabetes (unless > UACR 300 mg)
Thiazides or CCB = initial Drug Choice

2 or more Drugs are usually needed in Adult Black hypertensives to achieve
GOAL = BP < 130/80 mmHg
BP Drugs in Pregnancy (AHA/ACC 2017)

Women with Hypertension, planning to become pregnant or are pregnant need to be switched to

Methyldopa
Nifedipine (long acting)
Labetolol

Avoid: Diuretics
Contraindicated: ACE-inhibitors, ARB’s, Aliskiren
NON- Pharmacological Therapy

1) **Weight Loss** for overweight / obese Patients
2) Healthy Diet = DASH Diet
3) Sodium Restriction to < 6 gm Salt (2,400mg Na)
4) Potassium suppl.
   - best with Diet, unless contra-indicated in CKD
5) Increased **physical Activity**
6) **Reduced Alcohol Intake**
   - men 2 and women 1 Drink /Day

AHA /ACC 2017
Salt Sensitivity

Incidence:

- 25% Normotensive Individuals
- 50% Hypertensive Patients
- 85% Resistant Hypertension
- 75% Afro American Hypertensives

Most secondary Hypertension is Salt Sensitive:
( Diabetes, CKD, RAS, Pheo, Aldosteronism )

Salt intake of > 7 g or < 3 g in Hypertension or
< 3 g without Hypertension
has increased CV events and CV death
Potassium Benefits

1) Renal Vasodilation, increased eGFR and Natriuresis

2) BP Effect:
   50 meq. Of K = BP 4.4 / 2.5 mmHg

3) Higher K Diet lowered Renal Stone Risk
   ~ 50 % (Nurses Health Study)

DASH Diet: BP Reduction 11.6 / 5.3 mmHg
NSAID use in Hypertension and CKD

- Lower Efficacy of ALL Antihypertensive Drugs, incl. Diuretics by 10-15% (except CCB’s)
- Cause Salt Sensitivity (> 3-4 day use)
- In CKD 3 (< 60 ml GFR)
  - Reduce GFR by 10-15%
  - Risk of Hyperkalemia, AKI and CHF
Chemotherapy associated Hypertension

( FDA approved 9 Tyrosine Kinase Inhibitors)

VEGF (Vascular Endothelial Growth Factor) inhibitors reduce Angiogenesis (Growth) of Tumors, but also reduce NO Production and Vasodilation causing Vasoconstriction and Hypertension in ~ 50%

Therapy
1) CCB (Amlodipine) or ACEI / ARB
2) Diuretics and Beta Blockers

No Diltiazem or Verapamil (P 450 inhibition)
Leptin, Obesity and Hypertension

Hyperleptinemia is required for obesity associated hypertension but mechanism differ:

Male:
- increased hypothalamic SNS activation

Female:
- increased adrenal Aldosterone production

Clinical data show better response to aldosterone antagonists in women with obesity + hypertension

Faulkner A. et.al  Hypertension 2018 ;71:15
Resistant Hypertension (RHT)

**Definition:**

NOT at BP Goal: 130 / 80 mmHg

despite 3 different antihypertensive Drug Classes in moderate to full Doses, including a Diuretic

**Incidence:**

12% of all hypertensive Patients

De la Sierra et.al. Hypertension 2011;57:898-902
Issues in Resistant Hypertension

1) 1/3 controlled by ABPM and therefore NOT “Resistant”

2) **Adherence**
   German study using urine and blood drug analysis had only 53% compliance (#)

3) Identify contributing Factors
   Obesity, excessive ETOH, high Salt Intake

4) Stop interfering Substances
   NSAID, Stimulants (Sympathomimetics, Ephedra)
   Oral Contraceptives, Licorice

5) **Low Use**  *Mineralocorticoid Antagonists*:
   Aldactone (Eplenrenone) Use NHANES 3%
   REGARDS 18%

6) Identify secondary Causes

   Jung O et.al. J.Hypertens 2013;31:766-774
   REGARDS Study: Calhoun DA. et.al Hypertension 2014: 63:451
   AHA / ACC 2017
Therapy of Resistant Hypertension

1) Diet
   - Reduce Salt intake (measure urine spot Na)
   - Increase K intake (50 mEq = 4.5 mmHg lower SBP)

2) Chlorthalidone 12.5 to 25 mg (instead of HCTZ)

3) ACE inhibitors or ARB’s and CCB in full Doses

4) Add Aldactone (Epllenrenone, Amiloride)

5) If resting Pulse above 80/min add
   - Vasodilating Beta –Blocker (Nebivolol, Carvediolol)

Townsend RR. et.al. Hypertension, 2016; 68:1073
Categories of BP in Adults
AHA /ACC  2017

Normal   BP   < 120 / < 80 mmHg

Elevated  BP   120 -129 / < 80 mmHg

HYPERTENSION
Stage I  BP  130 -139 / 80 - 89 mmHg
Stage II BP  _> 140 / 90 mmHg

Be aware of Masked and White Coat Hypertension
Summary AHA / ACC 2017

Stage I = BP 130 /80 – 139 /89 mmHg

No clinical CVD and 10 Year ASCVD Risk < 10%
Lifestyle Therapy ( F/U 3 -6 Months )
Clinical CVD or 10 Year ASCVD Risk > 10%
Lifestyle and Drug Therapy ( F/U 1 Month )

Stage II = BP 140 /90 mmHg and above
Lifestyle and Drug Therapy ( F/U 1 Month )