RISK-BASED APPROACH TO THE HYPERTENSIVE PATIENT CLINICAL AND LABORATORY EVALUATION

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BACKGROUND

HTN: 4th. Largest mortality risk factor world-wide [6% of all deaths].
Mild HTN & Prehypertension: Largest proportion of BP-related CV death.

[Julius. Am.J.Hyperten.10:300s, 1997].

CVD Risk factors cluster with HTN:
- Insulin resistance.
- Lipid abnormality.
- Renal dysfunction.
- Obesity.
- Coagulation abnormality.
- LV & vascular Smooth muscle abnormality.

The residual lifetime risks for developing hypertension

Vasan et al. JAMA. 2002;287:1003

![Bar chart showing residual lifetime risks for developing hypertension.](image)
CVD risk by age, gender & No. of risk factors

Blood pressure

<table>
<thead>
<tr>
<th>SBP, mmHg</th>
<th>Men</th>
<th>Women</th>
</tr>
</thead>
<tbody>
<tr>
<td>150</td>
<td>160</td>
<td>170*</td>
</tr>
<tr>
<td>90</td>
<td>95</td>
<td>90</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Age</th>
<th>Men</th>
<th>Women</th>
</tr>
</thead>
<tbody>
<tr>
<td>40 yrs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>50 yrs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>60 yrs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>70 yrs</td>
<td></td>
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</table>

Risk factors

<table>
<thead>
<tr>
<th>Risk factors</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Symptomatic CVD</td>
<td></td>
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</tbody>
</table>

KEY
(10-year risk for CVD)

<10%  | 10-20% | 20-40% | >40% |

Symptomatic CVD
Risk factors for heart failure in US

AIM OF CLINICAL EVALUATION

DX OF HYPERTENSION.
TARGET ORGAN DAMAGE.
CV RISK STRATIFICATION.
CURABLE CAUSES.
Diagnostic work-up

- No universal scheme
- Extent of investigation depends on:
  - Background, gender, FH, age
  - Severity of HTN
  - Likelihood of target organ damage
  - Likelihood of secondary hypertension
  - Cost, time, and risk of diagnostic workup
History: Personal profile

- Duration of high BP.
- Maximal, minimal & average BP ± drugs.
- Validation of BP readings: by whom? Machine? One or both arms? Body position?

- Positive FH favors essential HTN.
- Smoking: risk profile.
- Alcohol: HTN.
- Diet salt habits
- Dark races: early & severe TO damage.
# Clinical characteristics of present-day hypertensive subjects

## Baseline features of 18,235 consecutive outpatients with HTN

<table>
<thead>
<tr>
<th>Feature</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Males [%]</td>
<td>45</td>
</tr>
<tr>
<td>Age [mean + SEM] [Y]</td>
<td>61.8 ± 0.09</td>
</tr>
<tr>
<td>Supine SBP [mmHg]</td>
<td>174.6 ± 0.1</td>
</tr>
<tr>
<td>Supine DBP [mmHg]</td>
<td>101.5 ± 0.06</td>
</tr>
<tr>
<td>Mean time since Dx. [M]</td>
<td>44</td>
</tr>
<tr>
<td>On Rx [%]</td>
<td>62.2</td>
</tr>
<tr>
<td>DBP 90-105 [%]</td>
<td>55.3</td>
</tr>
<tr>
<td>DBP 105-115 [%]</td>
<td>29.2</td>
</tr>
<tr>
<td>DBP &gt; 115 [%]</td>
<td>6.2</td>
</tr>
<tr>
<td>ISH [%]</td>
<td>9.3</td>
</tr>
</tbody>
</table>

Luccioni, R. La presse medicale 1995; 24:1857
History: Risk profile

Diabetes:
   Earlier & more severe complications of both.
   More strict BP control target.

Symptoms suggesting target organ involvement:
   Cardiac: dyspnea, chest pain, skipping palpitation
   Cerebral: stroke, transient deficits, dementia
   Peripheral: claudication
   Renal: usually silent till ESRD.

Recent resistance to treatment.
High-risk associations with HTN (Luccioni study)

- Dyslipid: 40
- Over 70 Y: 23.8
- DM, GI: 15
- CAD: 12
- Arrhythmia: 8.4
- DBP > 115: 6.1
- CHF: 4.3
- CRF: 3.9
Headache, flushing, red eyes and epistaxis [so-called symptoms of hypertension]

Poor indicators of presence or severity of HTN. Morning occipital, bitemporal or migraine-type headache do not tell normo- from hypertensives. Apart from hypertensive encephalopathy; headache is of no diagnostic value. Flushing, conjunctival injection, and epistaxis are equally poor indicators. Dependence of the patient on symptoms to take treatment leads to serious under-treatment.
The history: Drugs

Antihypertensive:
  Type, dose, duration
  Compliance, adverse effects.
  If stopped, why?

Drugs to cause or exacerbate HTN:
  NSAIDs
  Contraceptive pills
  Anorexic drugs
  Steroids
  Anti-asthmatic drugs
  Cold and flu medicines
The history: co-morbid conditions

Asthma
Drug allergy.
Hyperuricemia & gout.
Prostatic symptoms
Sexual dysfunction.
Depression.
Cerebrovascular insufficiency
Coronary artery disease
Peripheral vascular disease.
Postural hypotension
The ten handicaps of the elderly patient

Living alone  
Low fixed income  
Depression  
Poor memory  
Poor eye sight  
Malnutrition  
Limited mobility  
Arthritic hands  
Multi-morbidity, poly-pharmacy  
Tendency to postural hypotension, falls
History to suggest diagnostic work-up for secondary hypertension

Hx. of renal dis. [glomeriolonephritis, UTIs, Bilh, stone, renal colics, prostatic symptoms]

Abnormal urine tests [hematuria, albuminuria, pyuria, Bilharziasis].

Secondary drug resistance

Onset <20 or >50 Y. esp. with -ve FH of HTN.

Paroxysmal HTN: esp. with palpitation, headache, postural hypotension.
Physical examination

**Technique of BP measurement.**
Most mild-moderate HTN: NAD.
Weight, height, BMI, waist/hip ratio.
Most commonly missed: fundus exam.
1. The patient should be relaxed and the arm must be supported. Ensure no tight clothing constricts the arm.

2. The cuff must be level with the heart. If arm circumference exceeds 33cm, a large cuff must be used. Place stethoscope diaphragm over brachial artery.

3. The column of mercury must be vertical. Inflate to occlude the pulse. Deflate at 2–3mm/s. Measure systolic (first sound) and diastolic (disappearance) to nearest 2mmHg.
BP response to office visit

- Doctor
- Nurse

Increase in systolic BP, mmHg

Duration of visit, minutes

Peak 5 10
Home Monitoring of BP:
Specific Role in Selected Patients

Which patients?

- Non adherence
- Hypertension and diabetes
- Office-induced blood pressure elevation

Further assess using Ambulatory blood pressure monitoring

Home BP < 135/85 mm Hg
Cardiovascular prognosis by home BP in hypertensive elderly

4939 treated HT pts (70 ± 6.5Y, 48.9% male)
FU: 3.2 ± 0.5 Y
Primary EP: Total CVD mortality

<table>
<thead>
<tr>
<th>Home BP</th>
<th>Office BP</th>
<th>HR</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>N</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>H</td>
<td>H</td>
<td>1.96</td>
<td>1.27-3.20</td>
</tr>
<tr>
<td>H</td>
<td>N</td>
<td>2.06</td>
<td>1.22-3.47</td>
</tr>
<tr>
<td>N</td>
<td>H</td>
<td>1.18</td>
<td>0.67-2.10</td>
</tr>
</tbody>
</table>

Bobrie et al. JAMA 2004;291:1342
Significant physical findings-1

**Head & neck:**
- Fundoscopic changes
- Carotid murmurs
- Thyroid swelling, bruit
- Juvenile corneal arcus, xanthelasma
- Pallor & puffiness: renal disease
- Stigmata of endocrine disease

**Cardiac:**
- LVH, S4, S3, Cardiomegaly, MR
- Loud A2, early diastolic murmur
- Cardiac arrhythmia
Significant physical findings-2

**Chest:**
- Asthma, wheeze

**Neurologic examination:**
- Alertness, muscle power, transient deficits, dementia

**Abdomen:**
- Bruits
- Masses
- AAA

**Lower limbs:**
- Weak delayed femoral pulse
- Vascular bruit, degenerative changes
- Ankle-brachial index
## Diagnosis of HTN: Summary

### Visit 1
- **Risk Stratification**
- **Hx. Ex.**
- **Advice life style**
- **Order Lab**
- **Prescribe Rx. (Only for HT Urgency)**

### Visit 2
- **Measure BP.**
- **Review Hx.**
- **Stress life style**
- **Review lab.**

### Visit 3
- **Stress life style**
- **Measure BP.**
- **Prescribe Rx. If BP ≥ 180/100 or TOD**

### Visit 4
- **Stress life style**
- **Measure BP.**
- **Prescribe Rx. If BP ≥ 180/100 or TOD**

### Visit 5
- **Stress life style**
- **Measure BP.**
- **Prescribe Rx. If BP is still > 140/90**
<table>
<thead>
<tr>
<th>BASIC LAB TESTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>URINE ANALYSIS: DIPSTICK</td>
</tr>
<tr>
<td>FASTING PLASMA GLUCOSE</td>
</tr>
<tr>
<td>SERUM CREATININE</td>
</tr>
<tr>
<td>FASTING CHOLESTEROL</td>
</tr>
<tr>
<td>SERUM K</td>
</tr>
<tr>
<td>ECG</td>
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</tbody>
</table>

RIZK.HTN.DX.12.2004
ADDITIONAL WORK-UP IN SELECTED PATIENTS

- Ultrasonography
- Ambulatory BP monitoring
- Micro-albuminuria
EFFECT OF PRE-TEST PROBABILITY

RAS IN A MIDDLE AGED MAN WITH MILD HYPERTENSION

RAS IN AN ELDERLY DIABETIC WITH SEVERE HYPERTENSION

CAPTOPRIL RENOGRAM
Ultrasonography in hypertension

**Echocardiography: indicated for:**
- Borderline HTN without risk factors or evident end-organ damage: LVH necessitates drug therapy.
- Refractory hypertension or office hypertension of doubted significance.
- Known or suspected concomitant heart disease

**Echocardiography is NOT indicated** for routine measurement of LV mass or wall thickness.
Ultrasonography: other techniques

**Abdomen scan:**
- Kidney size & structure
- Renal / adrenal masses
- Aortic aneurysm
- Renal arterial Duplex

**Peripheral arterial duplex**
- Stenotic lesions
- Testing endothelial function

**Carotid / vertebral Duplex**
- Stenotic lesions
- Intima-media thickness
Special laboratory tests

**Micro-albuminuria** [24H UAE >30 mg] with normal urine sediment.
Clinical indication: early detection of nephropathy in diabetic patients.

**Plasma renin activity:**
   Clinical indication: suspected primary aldosteronism.
Possible causes of secondary drug resistance

Poor BP measurement technique.
Office HTN.
Pseudo-HTN.
Incompliance with medication or diet.
Inappropriate drug dosing or combination.
Drug-induced HTN.
Renal function deterioration.

Newly developing renal parenchymal, renal vascular, or endocrine disease.
Missed cause of 2ry HTN on initial evaluation.
Message: summary of approach

MILD HYPERTENSION
- Confirm
- Risk stratify
- Advice life style
- Observe
- Prescribe

MORE SEVERE HTN
- Confirm

RESISTANT HTN
- Exclude secondary
- Prescribe

HTN + DM
Message (2)

- Age is a cause for more energetic, not less energetic treatment of hypertension
- Systolic HTN is as important as, or more important than diastolic hypertension
- An extensive investigation for secondary hypertension will usually be expensive and useless.