Update on BP Measurement, ABPM, home/self and clinic...how does office automated fit in?

8.00 to 8.30
20 slides Maximum
Blood Pressure is a Moving Target
Disclosures

• Martin Dawes
• Family Doctor (just)
• Head of Family Practice at UBC
• No Pharma work for 3 years
• Expert 24 company to help with risk prediction algorithms for Norwich Union and others every year
Blood Pressure is a Moving Target

Your chart says you have high blood pressure. I guess there's nothing we can do but end it quickly. Sorry about that.
Digit Preference (Random popn)
Blood Pressure Graphical Display

DOB: 11.08.1952; Date: 11.07.94

Hypertensive?

Or Normotensive?
Ambulatory BP

- Gold Standard (unless intra arterial considered)
- $599 to $1700
- Use one used in trials
- FDA approved with a BHS AAMI algorithm –
- connects to a computer
- Don’t use without a computer
- Use just the averages
Hazard ratios (95% CI) by systolic blood pressure adjusted for age and gender, and stratified by cohort. (I)

This steeper gradient of hazard ratios through the range indicates that ABP is a stronger predictor of mortality.
What is WCH?

- White coat hypertension is defined when a patient has a persistently elevated clinic BP and a normal home or ambulatory BP day time average i.e. <135/85mmHg.
- Hypertension (WCH) 15% to 30% of the population
- It is more common in pregnancy and with increasing age.
White Coat Hypertension is Safe

### Prognostic Value of White-Coat and Masked Hypertension Diagnosed by Ambulatory Monitoring in Initially Untreated Subjects: An Updated Meta Analysis

Sante D. Pierdomenico and Franco Cuccurullo

<table>
<thead>
<tr>
<th>Study name</th>
<th>Hazard ratio</th>
<th>Lower limit</th>
<th>Upper limit</th>
<th>Z value</th>
<th>P value</th>
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<tr>
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**Meta Analysis**

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Masked Hypertension

- where clinic BP is normal but ABPM and/or HBPM measurements are elevated
- Prevalence ~20%
The prognosis of masked hypertension

Prevalence of masked hypertension is approximately 10% in the general population but is higher in patients with diabetes.
# Masked Hypertension

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Sante D. Pierdomenico and Franco Cuccurullo

<table>
<thead>
<tr>
<th>Study name</th>
<th>Statistics for each study</th>
<th>Hazard ratio</th>
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Meta Analysis

0.1 0.2 0.5 1 2 5 10
National Institute of Clinical Excellence 2011

- If the first and second blood pressure measurements taken during a consultation are both higher than 140/90 mmHg,
- offer 24-hour ambulatory blood pressure monitoring (ABPM) to confirm the diagnosis of hypertension.
Better testing cost less

• The savings with ambulatory monitoring compared with monitoring in the clinic and the home were primarily because of the costs of hypertensive treatment that were avoided because of the higher specificity of ambulatory monitoring.

• The discounted treatment costs for men aged 60 years were £776 for monitoring in the clinic compared with £744 for monitoring in the home and £631 for ambulatory monitoring.
Why?: Cost effectiveness

Office Cannot detect WCH or Masked Hypertension

- But ABPM is expensive
- The equipment
- Needs computer analysis
- Two appointments

- Plan B Automated Office BP
Home BP

- Needs a valid tool
- Readings recorded in duplicate in the morning (from 6 to 10 a.m.) and night (from 8 p.m. to 12 p.m.) with an interval of 2 min between each, for 3 consecutive days (on weekdays if the patient works, or according to their normal activity if they are retired).
- To calculate the mean BP, the readings of the first day are excluded and the first and second readings of each morning–night period of the second and third days were used.
Linear regression analysis between left ventricular mass index and systolic blood pressure. Regression line equations: Systolic HBP = 0.471 × LVMI + 116.012; Systolic ABP = 0.278 × LVMI + 119.373. If LVMI = 50, HBP = 139.6 mmHg and daytime ABP = 133.3 mmHg. LVMI, left ventricular mass index; SABP, systolic ambulatory blood pressure; SHBP, systolic home blood pressure.
Cut Point for WCH

190 patients Two tests (hBPSM and ABPM) were compared in a series of patients aged from 18 to 80 years with mild-moderate hypertension selected consecutively and without previous antihypertensive treatment. Recruited in primary care

Fig. 1 Receiver operating characteristic curve comparing different blood pressure cut-off points in the diagnosis of white-coat hypertension (BP <135/85 mmHg for ABPM) with home blood pressure self-monitoring (hBPSM). Black dots represent normality cut-off points for hBPSM in mmHg.
Automated Office

• Measures BP alone
• Does it 6 times BPTru
• Does it three times with Intellisense
• Takes averages
ROC Curves for AOBP and Home BP for detecting raised ABPM

- very similar diagnostic characteristics (if done well)
- Beckett (AOBP) -> Systolic Target Achieved on ABPM (<135 mmHg mean daytime blood pressure)
- Bayo -> (Home) The normality cut-off point for outpatient tests in the comparative study was a mean diurnal BP <135/85 mmHg for ABPM
ROC Curves for AOBP and Home BP for detecting raised ABPM
Diagnostic algorithm for high Blood Pressure including Office, ABPM and Home Blood Pressure Measurement

BP: 140-179 / 90-109

Clinic BP

Hypertension visit 3
≥160 SBP or ≥100 DBP → Diagnosis of HTN
<160 / 100 → or → ABPM or HBPM

Hypertension visit 4-5
≥140 SBP or ≥90 DBP → Diagnosis of HTN
<140 / 90 → Continue to follow-up

ABPM (If available)

Awake BP < 135/85 and 24-hour < 130/80

Continue to follow-up

Diagnosis of HTN

≥135 SBP or ≥85 DBP
Or 24-hour ≥130 SBP or ≥80 DBP

HBPM

< 135/85 or
≥ 135 SBP or ≥ DBP 85

Continue to follow-up

Diagnosis of HTN
My Own Proposed Algorithm for AOBP/Home BP in Clinical Practice in non diabetic or renal patients (not validated and not policy)

1. **AOBP/Home**
   - **< 130/80**
     - Continue to follow
   - **≥ 140/90**
     - Diagnosis of Hypertension
   - **130-139/80-89**
     - 24-h ABPM
       - Awake BP:
         - < 135/85 and 24-hour < 130/80
       - Awake BP:
         - ≥ 135 SBP or ≥ 85 DBP
         - Or 24-hour:
           - ≥ 130 SBP or ≥ 80 DBP