Clinical Applications & Comparisons of the Oscar 2 & Spacelabs 90207 Ambulatory Blood Pressure Monitors (ABPMs) Using a Novel Dual Monitor Protocol
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Katie Foster, Laura Emmons, Donna Wilcox, Richard Padgett MD & John Halliwill PhD assisted with ABPMs.
3 Testing Phases

Baseline Lab
Seated Routine
n = 17: 7 O, 10 ♀

Postural Lab
Supine, Seated, Standing
n = 12: 3 O, 9 ♀

24-hr ABPM
7 Single ABPM, 5 Dual APBM
n = 6: 2 O, 4 ♀

Purpose: cf: Accuracy of 2 oscillometric ABPMs vs Observer-corrected BPs in field
Hypotheses: ABPMs differ from each other & Observer-corrected BPs in field

Hg + Thinklabs
Oscar 2
Spacelabs 90207
OBSERVERS w/Hg Column vs OSCAR 2
SYSTOLIC BLOOD PRESSURE (SBP)
MEAN vs DIFFERENCE, N = 17, 102 SBPs

Oscar overestimates SBP by ~ 10 mm Hg, but with wide variability!

+2 SD = +9.0
-2 SD = -28.7

$\bar{X} = -9.8$
$P < 0.001$

Baseline Lab
OBSERVERS w/Hg Column vs SPACELABS 90207
SYSTOLIC BLOOD PRESSURE (SBP)
MEAN vs DIFFERENCE, N = 17, 102 SBPs

Spacelabs overestimates SBP by ~ 5 mm Hg, but with wide variability!

+2 SD = +10.5
-2 SD = -20.9

Baseline Lab
Oscar 2 & Spacelabs 90207 ABPM Flashlight Effect & Field Summary

NB: Single-monitor studies: 450 BPs, 148 hr 55 min, 6 subjects, 2 Q, 4 C, 7 ABPM field tests, 242 BPs from 4 Oscar ABPM field tests, 208 BPs from 3 Spacelabs field tests. All values $\bar{X} \pm SE$, mm Hg. Observer-corrected vs Oscar: SBP $\Delta = -4.6 \pm 0.4$ (117.9 ± 1.0 vs 122.5 ± 1.1); DBP $\Delta = -2.3 \pm 0.5$ (63.4 ± 1.0 vs 65.7 ± 0.7); MAP $\Delta = -3.1 \pm 0.3$ (81.5 ± 0.9 vs 84.6 ± 0.7), all $P < 0.001$.

Observer-corrected vs Spacelabs: SBP $\Delta = 1.9 \pm 0.3$ (132.2 ± 1.4 vs 130.3 ± 1.2); DBP $\Delta = 5.3 \pm 0.7$ (84.4 ± 1.6 vs 79.1 ± 1.0); MAP $\Delta = 3.5 \pm 0.6$ (100.3 ± 1.5 vs 96.8 ± 1.0), all $P < 0.001$. 
OBSERVER-CORRECTED (OB-COR) vs. OSCAR ABPM 24-HR SYSTOLIC BLOOD PRESSURE (SBP), 19 yr o

- 56 Valid BPs over 24 hr 43 min
- OSCAR $\bar{X} \pm SE = 135.5 \pm 2.2$ mm Hg, $8.7 \pm 1.2$ mmHg
- OBS-COR $\bar{X} \pm SE = 126.8 \pm 1.8$ mm Hg
- $*** P < 0.001$, Cohen's $d = 0.9$, Large difference

**Graph Details:**
- SYSTOLIC BLOOD PRESSURE (mm Hg)
- TIME (hr)
- Events: Sleep, Walking to Class, In Lecture, Relaxing, Working on Computer, Walking & Exercising @ Rec Center, Repeat E4 Error Codes, E2 Artifact + E4 Error Codes, Brief Arousal Due to Repeat Measures, E4 Error Code, No 1 ant Data, BP Time Out

24-hr ABPM
Oscar vs. Spacelabs Systolic Blood Pressure (SBP)
Simultaneous, Opposite Arm Measures, 66 yr old

101 Simultaneous BPs over 24 hr 12 min

- Oscar \( \bar{X} + SE = 156.8 \pm 1.2 \text{ mm Hg} \)
- Spacelabs \( \bar{X} + SE = 144.3 \pm 0.9 \text{ mm Hg} \)

\( \bar{X} = 156.8 \pm 1.2 \text{ mm Hg} \) vs. \( \bar{X} = 144.3 \pm 0.9 \text{ mm Hg} \)

*** \( P < 0.001 \), Cohen's \( d = 1.3 \)

> Large difference

- Biking
- Church
- Cuff itch & R forearm flush
- TV
- Sleep attempted
- Stairs
- Dozed off
- Eating
- Cuff crimp & itch
- A = Awake
- S = Sleep attempted

\( *** P \leq 0.001 \)
Oscar 2 biased toward hypertension or masked hypertension, $1^0$ based on SBP overestimation.

Spacelabs 90207 biased toward normotension or white-coat hypertension, $1^0$ based on DBP underestimation.

Conclusions from 24-hr ABPM Field Studies

Out of Office BP
- Home BP: 130/80 mm Hg
- Daytime BP: 130/80 mm Hg
- Sleep BP: 110/65 mm Hg
- 24-hr ABPM: 125/75 mm Hg

Summary & Conclusions from ABPM Field Studies

1. Oscar 2 & Spacelabs 90207 ABPMs differ clinically & statistically from each other & observer-corrected values.

2. Both the Oscar 2 & Spacelabs 90207 demonstrate a flashlight effect & difficulties estimating SBP, DBP & PP from MAP.

3. The Oscar 2 is prone to SBP overestimation while the Spacelabs 90207 is prone to DBP underestimation.

4. Evaluation of each subject is dependent upon the ABPM selected & postures assumed during field testing.

5. ABPM accuracy & reliability cannot be trusted until national & international validation protocols required postural testing.

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