# COMPARISON BETWEEN LEVEL III PORTABLE MONITORING SYSTEM AND PSG ON 44 INLAB PATIENTS

## INTRODUCTION

AASM published guidelines in 2007 for the use of portable monitoring (PM) systems in the diagnosis of OSA. Concern remains about the validity of PM measurements. PM devices usually provide modules for automatic and manual scoring. Evaluation of current levels of performance require direct comparison between PM (automatic and manual scoring) and PSG data.

## METHOD

Prospective, random selection of 44 patients (Table 1) - suspected, on clinical history & examination, of having OSA - simultaneous PSG and PM recording in a sleep laboratory – PM = Braebon MediByte Jr. (MBJr), (Level III device - oronasal cannula, thorax RIP belt, finger pulse oximeter, body position sensor in MBJr) - AASM guidelines 2007 for sleep staging and respiratory events used - PM data analyzed using Braebon's automatic scoring module (MBA) and data scored manually (MBM) by experienced RPSGT. PSG data scored by the same tech - comparisons performed between MBA, MBM, and PSG. Sensitivity and specificity scores calculated for the presence and absence of OSA and for all degrees of OSA. MBJr data also recalculated with PSG TST.

## RESULTS

**Table 1**

| Demographics & Clinical Profile | | | | | |
|---|---|---|---|---|---|
| **Sex** | M: 29, F: 15 | | | | |
| **Age** | Aver: 47yr (17–75yr) | | | | |
| **BMI** | Aver: 33kg/m$^2$ (23–64) | | | | |
| **EDS** | 5 | **ESS** | 10 | **URS** | 2 |
| **FTG** | 4 | **Snore** | 84% | **W/Aps** | 59% |

**(EDS – Excessive daytime sleepiness score (VAS 0-10); ESS – Epworth; URS – unrefreshing sleep (Likert 1-5); FTG – Fatigue score (VAS 0-10))**

**Table 2.1**

| Summary Chart of Raw Score Data<br>Sum of all records (n=44) | | | | | | |
|---|---|---|---|---|---|---|
| | MB Auto | | MB Manual | | PSG | |
| **Events** | **Total** | **Index** | **Total** | **Index** | **Total** | **Index** |
| **Centrals** | 0 | 0 | 99 | 12 | 425 | 91 |
| **Obstructives (Aps)** | 2990 | 431 | 3068 | 448 | 847 | 188 |
| **Mixed** | 0 | 0 | 3 | 0 | 191 | 35 |
| **Hypopneas (Hyps)** | 1656 | 243 | 1993 | 292 | 3109 | 673 |
| **Aps & Hyps** | 4646 | 674 | 5146 | 752 | 4581 | 986 |
| **Desaturations** | 4208 | 610 | 4245 | 616 | | |
| **Snoring** | 117425 | 16498 | 117107 | 16513 | 44612 | 8136 |

**Table 2.2**

| Summary Chart of Raw Score Data contd.<br>Average of all records (n=44) | | | | | | |
|---|---|---|---|---|---|---|
| | MB Auto | | MB Manual | | PSG | |
| **Events** | **Total** | **Index** | **Total** | **Index** | **Total** | **Index** |
| **Centrals** | 0 | 0 | 2 | 0 | 10 | 2 |
| **Obstructives** | 68 | 10 | 70 | 10 | 19 | 4 |
| **Mixed** | 0 | 0 | 0 | 0 | 4 | 1 |
| **Hypopneas** | 38 | 6 | 45 | 7 | 71 | 15 |
| **Apneas & Hypopneas** | 106 | 15 | 117 | 17 | 104 | 22 |
| **Desaturations** | 96 | 14 | 96 | 14 | | |
| **Snoring** | 2669 | 375 | 2662 | 375 | 1014 | 185 |

**Table 3**

| (n = 44) | AHI | NPA (< 5) | (%) | Mild (>=5,<15) | (%) | Moderate (>=15,<30) | (%) | Severe (>=30) | (%) |
|---|---|---|---|---|---|---|---|---|---|
| **MBJr Auto** | 15 | 19 | 43% | 9 | 20% | 6 | 14% | 10 | 23% |
| **MBJr Manual** | 17 | 18 | 41% | 8 | 18% | 7 | 16% | 11 | 25% |
| **PSG** | 22 | 14 | 32% | 13 | 30% | 5 | 11% | 12 | 27% |

**(NPA = non-pathological apnea)**

**Table 4**

| PSG | MB Auto | | | | MB Manual | | | |
|---|---|---|---|---|---|---|---|---|
| | **NPA** | **Mild** | **Moderate** | **Severe** | **NPA** | **Mild** | **Moderate** | **Severe** |
| **NPA** | 13 | 1 | 0 | 0 | 12 | 2 | 0 | 0 |
| **Mild** | 6 | 5 | 2 | 0 | 6 | 6 | 1 | 0 |
| **Moderate** | 0 | 3 | 2 | 0 | 0 | 0 | 5 | 0 |
| **Severe** | 0 | 0 | 2 | 10 | 0 | 0 | 1 | 11 |

**Table 5**

| PSG | MB Auto | | MB Manual | |
|---|---|---|---|---|
| | **Sensitivity** | **Specificity** | **Sensitivity** | **Specificity** |
| **NPA** | 80% [1:5] | 93% [1:14] | 80% [1:5] | 86% [1:7] |
| **Mild** | 38% [2:3] | 87% [1:8] | 46% [1:2] | 94% [1:17] |
| **Moderate** | 40% [3:5] | 87% [1:8] | 100% [0:10] | 81% [1:5] |
| **Severe** | 83% [1:6] | 100% [0:10] | 92% [1:13] | 100% [0:10] |

**(Assumption – PSG is the accurate score; then [ ] = misidentifications.)**

**Table 6**

| | MB Auto | MB Manual | PSG |
|---|---|---|---|
| **Total recording/sleep time** | 6.90 | 6.84 | 4.65 |
| **AHI by own time** | 15 [-32%] | 17 [-23%] | 22 |
| **AHI by PSG time** | 23 [+5%] | 25 [+14%] | 22 |

**(Assumption – respiratory events probably occurred during sleep only, therefore, dividing by true sleep time will give more accurate AHI.
[ ] = variance from PSG result.)**

## CONCLUSIONS

- The automatic scoring system in this device is within the range of the sensitivities of PSG studies (75-88%).
- Having the data reviewed manually significantly improves the sensitivities of the OSA severity classes.
- Identifying TST improves the concordance substantially.
- Clinical decisions that seem warranted from this study based on MBJr alone, that is, using automatic scoring module data only, include:
  - If the MBJr identifies OSA, good agreement with PSG [13:14]; meets minimum AHI criteria for diagnosis; treatment justified.
  - If MBJr indicates NPA, cannot rely on it [wrong 1:5 patients], non-treatment unjustified.
  - If MBJr indicates mild or moderate OSA and therefore, possible oral appliance treatment, not reliable [wrong 1:6 patients], OA treatment not justified; if OA therapy not a consideration, CPAP treatment justified.
  - If MBJr indicates severe OSA, CPAP treatment justified [100% agreement].

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