

# Home Sleep Testing

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# Objectives

- What defines a good test?
- Types of Portable Monitoring
- Performance of Portable Monitors
- Outcomes using Portable Monitoring
- Future Directions

# Goals of Sleep Testing

- For this discussion limit testing to the diagnosis of sleep disordered breathing.
- Separate patients with abnormal breathing at night from those with normal breathing.

# Gold Standard Test

- 100% sensitive

Sensitivity – Ability of a test to recognize patients who have sleep apnea

- 100% specific

Specificity – Ability of a test to recognize patients who do not have sleep apnea

# Sensitivity & Specificity

	Disease Present	Disease Absent	Total
Test Positive	A	B	A+B
Test Negative	C	D	C+D
Total	A+C	B+D	

$A/A+C$   
sensitivity

$D/B+D$   
specificity

# Sensitivity and Specificity

- Excellent way to gauge the accuracy of a test
- Not very helpful clinically because they are based on known presence/absence of disease

# Positive and Negative Predictive Values

	Disease Present	Disease Absent	Total	
Test Positive	A	B	A+B	$A/A+B$ <b>PPV</b>
Test Negative	C	D	C+D	$D/C+D$ <b>NPV</b>
Total	A+C	B+D		

# Positive and Negative Predictive Values

- Positive predictive value and negative predictive value
  - Depend on disease prevalence

# Positive and Negative Predictive Values

	Disease Present	Disease Absent	Total	
Test Positive	9	9	18	50% <b>PPV</b>
Test Negative	1	891	892	99% <b>NPV</b>
Total	10	990	1000	1% <b>Prevalence</b>

Test with 90% sensitivity and 90% specificity

# Positive and Negative Predictive Values

	Disease Present	Disease Absent	Total	
Test Positive	450	50	500	90% <b>PPV</b>
Test Negative	50	450	500	90% <b>NPV</b>
Total	500	500	1000	50% <b>Prevalence</b>

Test with 90% sensitivity and 90% specificity

# Likelihood Ratios

- $+LR = (\text{sensitivity}/(1-\text{specificity}))$
- Proportion of patients with the disease and a positive test divided by the proportion of people without disease and a positive test
- $-LR = (\text{specificity}/(1-\text{sensitivity}))$
- Proportion of patients without the disease and a negative test divided by the portion of patients with the disease and a negative test

# Useful ranges of LR

LRs greater than 10 or less than 0.1	cause large changes
LRs 5 - 10 or 0.1 - 0.2	cause moderate changes
LRs 2 - 5 or 0.2 - 0.5	cause small changes
LRs less than 2 or greater than 0.5	cause tiny changes
LRs = 1.0	cause no change at all

# Medical Decision Making

- Step 1 – Determine the threshold of the probability the patient has disease that would cause you to treat it.
- Depends on the consequences of treating or not treating.

# Using Likelihood Ratios

- Determine Pre-test probability
- Convert pre test probability to pre test odds (probability/1-probability)
- Multiply pre test odds by the LR ratio to get post test odds
- Convert post test odds to post test probability = (odds/1+odds)

# Pre-test Probability

- Subjective estimates (clinical experience)
  - 50yo male with loud snoring, obesity, htn
- Disease prevalence
  - 27% of working age males in Wisconsin cohort
- Prediction rules
  - Berlin, Stop-bang

# Using LR

- 80% pre test probability = pre test odds of 4
- $4 \times 10$  (+LR) = post test odds of 40
- Post test odds 40 = post test prob 98%

# Using LR

- 80% pre test probability = pre test odds of 4
- $4 \times .05$  (-LR) = post test odds of 0.2
- Post test odds 0.2 = post test prob 16%

# Objectives

- What defines a good test?
- **Types of Portable Monitoring**
- Performance of Portable Monitors
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**Table 1—Portable Monitoring Devices**

Type of Portable Monitoring Device	Parameters Measured
Type 2 Comprehensive Portable	Polysomnography Minimum of 7 channels, including electroencephalogram, electrooculogram, chin electromyogram, electrocardiogram or heart rate, airflow, respiratory effort, and oxygen saturation
Type 3 Modified Portable Sleep Apnea Testing	Minimum of 4 channels monitored, including ventilation or airflow (at least 2 channels of respiratory movement, or respiratory movement and airflow), heart rate or electrocardiogram, and oxygen saturation
Type 4 Continuous Single or Dual Bioparameters	One or 2 channels, typically including oxygen saturation or airflow

# “Other” types of portable monitoring

- Watch Pat
- 4 channel device that records peripheral arterial tone, pulse oximetry, heart rate, and actigraphy

# In Lab Polysomnography

- Retrospective chart review of 241 patients with 2 PSGs
- 28 patients studied a 2<sup>nd</sup> time because of persistence of symptoms
- 9 of the 28 patients found to have sleep apnea on the second study
- 7 of the 9 had severe sleep apnea

**Table 1—Comparison of Polysomnographic Data from the First and Second Studies\***

Patient	Age, yr	Sex	Weight, kg	Interval between Tests, mo	Total Sleep Time, h	Total Time REM Sleep, h	Apnea Index	Hypopnea Index	Lowest Oxygen, %
1	31	F	112.7/107.7	50	5.5/4.2	0/0	0.36/8.6	0/20.24	91/49
2	44	F	107.7/106.4	3	1.41/3.9	0/0	0/22.6	6.14/14.9	44/48
3	21	F	169.1/191.8	47	1.38/5.82	0/1.05	0/8.8	0/13.23	82/47
4	41	M	144.5/122.7	3	3.93/6.6	0.55/0.50	3.05/36	2.3/11.52	40/39
5	47	M	152.3/177.3	5	6.17/6.02	0.47/0.80	1.62/56.2	6.32/31	38/48
6	60	M	85/81.8	7	4.25/4.42	0.63/1.83	4.24/45.9	0/0	95/92
7	51	F	106.8/106.8	14	5.88/6.88	0.48/0.83	0/47.52	0/18.02	79/42
8	62	M	104.5/106.4	18	2.7/4.43	0.30/0.57	3.7/41.8	30.4/16.25	38/75
9	41	F	157.7/150.5	21	2.6/5.65	0/1.16	1.92/81.8	31.15/32.74	36/31
Mean	44.2	5F 4M	125.5/126.6 126.7/127.9	18.7	3.75/5.32	0.27/0.75	1.65/38.8	8.48/17.54	60.3/52.3

Sleep Time, h

	Total	Stage I	Stage II	Stage III	Stage IV	REM Sleep
First study	3.75 ± 1.84	0.90 ± 0.65	1.23 ± 0.99	0.54 ± 0.62	0.80 ± 1.08	0.27 ± 0.27
Second study	5.32 ± 1.11	1.03 ± 0.59	1.80 ± 0.68	0.78 ± 0.29	0.97 ± 1.52	0.75 ± 0.58
Probability value	0.04	NS	NS	NS	NS	0.037

# Polysomnography

- 11 patients with a high pre-test probability of the disease were re-studied
- 6 of the 11 patients found to have OSA on the second study

# Conclusion

- Polysomnography is a reference standard, not a gold standard.
- Night to night variability caused by:
  - sleep architecture
  - sleep position
  - medications
  - etc.
- Patients with a high pre-test probability of the disease need 2 studies to rule out OSA

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# Type 2 Portable Monitoring

- Ares/Watermark
- Respironics Alice PDX
- Compumedics Somte
- Embletta
- These were excluded from the 2007 report by the Portable Monitoring Task Force

**Table 3—Clinical Results From In-Laboratory and In-Home ARES vs Polysomnography**

Results	In-Laboratory ARES (n = 285)		In-Home ARES (n = 187)	
	± SD	95% Confidence Interval	± SD	95% Confidence Interval
κ score	0.85	0.77–0.89	0.77	0.66–0.85
Sensitivity	97.4	95.0–98.8	91.5	87.3–94.4
Specificity	85.6	80.4–88.5	85.7	78.8–90.6
Positive predictive value	93.6	91.3–94.9	91.5	87.3–94.4
Negative predictive value	93.9	88.3–97.1	85.7	78.8–90.6

# Ares Validation

- +LR = 6.76
- -LR = 0.03

# Ares Validation

	<u>Patients (n = 77)</u>			<u>Volunteers (n = 20)</u>		
	Mean	Min	Max	Mean	Min	Max
Gender, number						
Men	60			9		
Women	17			11		
Age, y	46	26	74	36	19	73
BMI, kg/m <sup>2</sup>	30	21	70	24	19	32

# Ares Validation

	<b>Prevalence</b>	<b>Sensitivity</b>	<b>Specificity</b>	<b>LR+</b>	<b>LR-</b>
<i>AHI4%, no./ h</i>					
≥ 5	0.60	0.98	0.84	6.05	0.02
≥ 10	0.42	0.97	0.85	6.46	0.03
≥ 15	0.39	0.92	0.95	17.11	0.09
<i>RDI, no./h</i>					
> 10	0.75	0.91	0.87	7.00	0.10
≥ 15	0.61	0.95	0.94	17.04	0.06

# Type 3 Portable Monitoring

- Resmed Apnealink Plus
- Respironics Stardust
- Medibyte/Medibyte Jr

# Somnocheck Validation

- 157 subjects referred for OSA evaluation underwent PSG with simultaneous portable monitoring, then HST with level 3 device on separate night
- Pregnant women, patients with severe comorbidities and pts unable to perform test were excluded

**Table 1—Characteristics of the Population Studied Using Different Diagnostic Methods\***

	PSG (n = 157)	Lab-PM (n = 149)	Home-PM (n = 121)
Men, n (%)	113 (73%)	111 (75%)	84 (69%)
Age, yr	45 ± 12	45 ± 12	45 ± 11
Hypertension, n (%)	47 (29.9%)	44 (29.5%)	34 (28%)
BMI, kg/m <sup>2</sup>	29.1 ± 5.5	29.2 ± 5.5	28.7 ± 5.4
Current or ex-smoker, n (%)	74 (47%)	70 (47%)	56 (46%)
Systolic BP, mm Hg	129 ± 12	129 ± 12	129 ± 12
Diastolic BP, mm Hg	82 ± 8.8	83 ± 8.8	83 ± 9
ESS	11 ± 5	11 ± 5	11 ± 5
Mean SaO <sub>2</sub> , %	92 ± 3	93 ± 3	93 ± 3
Lowest SaO <sub>2</sub> , %	79 ± 12	80 ± 12	80 ± 12
Time asleep on PSG, h	6.5 ± 1.0	—	—
A-FRT, h	—	6.4 ± 1.8	5.8 ± 2.8
AHI, AH/h	30.2 ± 27.8	27.5 ± 24.7	25.9 ± 22.5
Median AHI, AH/h (interquartile range)	21 (7,5–47)	20 (7,5–44,5)	21 (7–45,5)
Mean SaO <sub>2</sub> , %	92.4 ± 2.7	94.6 ± 2.3	94.8 ± 2.0
Lowest SaO <sub>2</sub> , %	79.5 ± 11.6	82.7 ± 8.4	82.1 ± 8.3
Time in supine position, % of A-FRT	—	63 ± 35	63 ± 34

\*Values are mean ± SD except where otherwise indicated. A-FRT = artifact-free recording time; AH = apnea-hypopnea.

# Somnocheck Validation

OSAS Classification by PSG	Sensitivity, % (95% CI)	Specificity, % (95% CI)	Positive Predictive Value, %	Negative Predictive Value, %
AHI $\geq$ 5	96.15 (92.5–99.8)	64.7 (42.0–87.4)	94.3 (89.9–98.7)	73.3 (51.0–95.7)
AHI $\geq$ 10	90.7 (82.7–95.2)	82.9 (67.3–91.9)	92.9 (85.3–96.7)	68.4 (62.8–88.6)
AHI $\geq$ 15	81.3 (71.1–88.5)	82.6 (69.3–90.9)	88.4 (78.8–94.0)	73.1 (59.7–83.2)
AHI $\geq$ 30	80.0 (68.3–91.7)	92.1 (86.0–98.2)	85.7 (75.1–96.3)	88.6 (81.6–95.6)

# Somnocheck Validation

OSAS Classification by PSG	+LR/ -LR
AHI $\geq$ 5	2.7/0.05
AHI $\geq$ 10	5.2/0.11
AHI $\geq$ 15	4.6/0.22
AHI $\geq$ 30	10.1/0.21

# Type 4 Portable Monitoring

- Apnea Link

# Apnea Link Validation

<b>Demographic Characteristic</b>	<b>Results</b>
Age, y	57.3 ± 12.0 (36 - 79)
BMI, kg/m <sup>2</sup>	32.6 ± 6.8 (19.8 - 52.9)
Sex	
Men	29 (49)
Women	30 (51)
Prevalence of AHI at various levels	
≥ 5	41 (69)
≥ 10	28 (47)
≥ 15	22 (37)
≥ 20	18 (31)
Comorbidities	
History of Angina	10 (17)
Heart failure	2 (3)
Valvular Disease	2 (3)
Hypertension	32 (54)
Asthma	7 (12)
Bronchitis	7 (12)
Allergies	22 (37)

# Apnea Link Validation

<b>AHI</b>	<b>Sensitivity</b>	<b>Specificity</b>	<b>PPV</b>	<b>NPV</b>
$\geq 5$	85.4	50.0	79.6	60.0
$\geq 10$	82.1	83.9	82.1	83.9
$\geq 15$	90.9	94.6	90.9	94.6
$\geq 20$	83.3	92.7	83.3	92.7

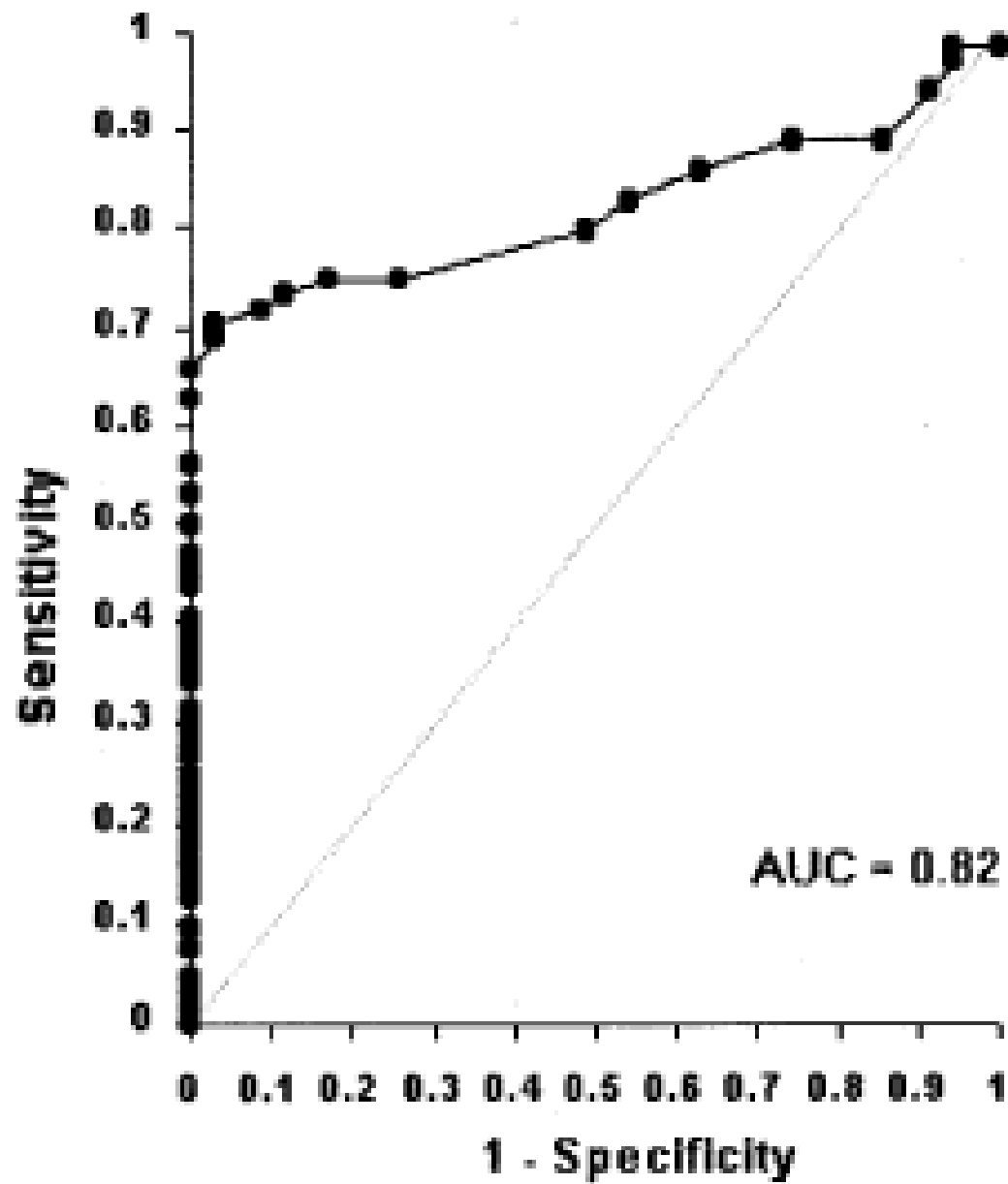
+LR = 16.8

-LR = 0.1

# Watch Pat Validation

**Table 1—Study Group Mean Age, BMI, and Total ESS Score by Gender\***

Variables	Male (n = 78)	Female (n = 24)	Overall (n = 102)
Age, yr	42.0 ± 15.0	39.6 ± 16.2	41.4 ± 15.2
BMI	27.5 ± 5.5	24.5 ± 4.8	26.8 ± 5.5
ESS score	8.7 ± 5.8	7.0 ± 5.7	98.3 ± 5.8



CHEST / 123 / 3 / MARCH, 2003

# Watch Pat

- For AHI of 15 events per hour
- Sensitivity = 93.3%
- Specificity = 73.3%
- +LR = 3.5
- -LR = 0.1

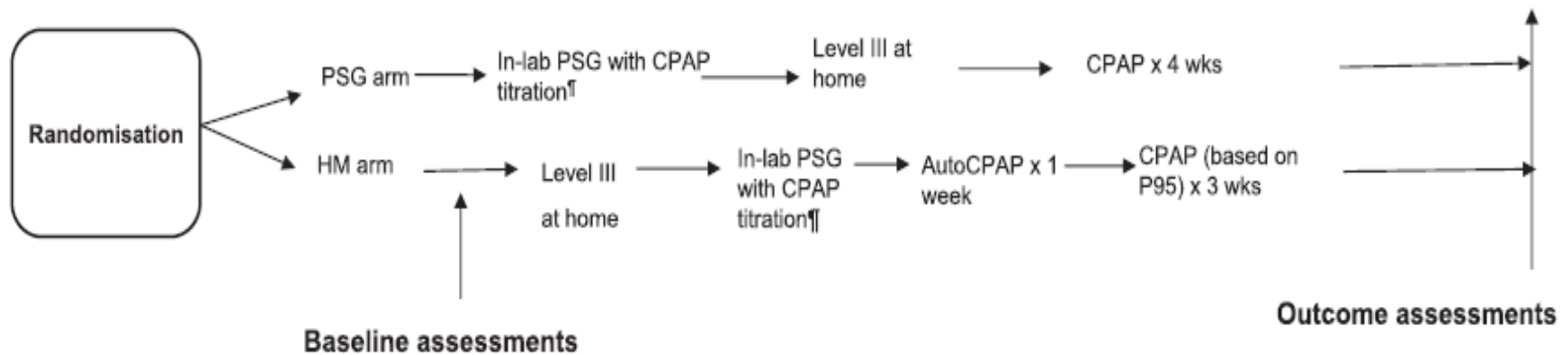
# Objectives

- What defines a good test?
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- Future Direction

# Outcomes of HST vs PSG I

- 102 subjects referred for OSA evaluation randomized to HST with APAP titration and fixed pressure therapy vs PSG, titration, and therapy.
- Outcomes after 4 weeks of CPAP therapy
- Outcome measures were ESS, PSQI, SAQLI, SF-36, BP, CPAP compliance

# Outcomes of HST vs PSG I



**Table 1—Baseline Characteristics of Subjects With Obstructive Sleep Apnea**

Characteristic	PSG (n = 45)	HM (n = 44)	P Value
Age, y	49.6 ± 10.3	47.8 ± 11.3	.433
Sex, M (F)	30 (15)	30 (14)	.879
BMI, kg/m <sup>2</sup>	34.6 ± 6.7	31.4 ± 5.9	.0194
AHI (PSG)	31.7 (5.2-96.2)	25.1 (5.2-111.1)	.006
AHI (HM)	28.8 (3.0-67.0)	22.3 (5.0-103.0)	.032
ODI	25.4 ± 18.4	21.1 ± 24.8	.33
AHI > 30, No. (%)	19 (42)	8 (18)	.021
ESS	12.8 ± 4.8	12.5 ± 3.6	.702
SBP, mm Hg	134 ± 16	130 ± 16	.202
DBP, mm Hg	86 ± 10	84 ± 9	.360
PSQI; SAQLI	8.7 ± 3.3, 4.07 ± 1.00	9.2 ± 4.0, 4.01 ± 0.96	.546, .780
PSG-derived CPAP pressure, cm H <sub>2</sub> O	8.9 ± 2.3	8.5 ± 2.1	.477
P95, cm H <sub>2</sub> O	N/A	9.8 ± 1.6 <sup>a</sup>	.017
SF-36 PF	75.3 ± 20.4	78.5 ± 21.6	.474
SF-36 RP	51.1 ± 43.3	62.5 ± 39.4	.198
SF-36 bodily pain	61.9 ± 22.6	70.0 ± 22.6	.094
SF-36 GH	61.8 ± 18.4	67.5 ± 17.4	.135
SF-36 VT	34.4 ± 20.2	38.1 ± 21.3	.397
SF-36 SF	69.4 ± 26.6	71.0 ± 22.5	.764
SF-36 RE	63.7 ± 42.5	59.9 ± 42.3	.669
SF-36 MH	71.9 ± 14.9	71.0 ± 16.6	.807
SF-36 PCS	45.2 ± 8.95	49.1 ± 8.7	.04
SF-36 MCS	44.3 ± 10.3	43.1 ± 11.6	.594
SAQLI	4.07 ± 1.00	4.01 ± 0.96	.780

Characteristic	PSG (n = 37)	HM (n = 33)	$\beta$ Estimate <sup>a</sup>	P Value
ESS	6.4 $\pm$ 3.8	6.5 $\pm$ 3.8	-0.298	.709
SBP, mm Hg	129 $\pm$ 11	125 $\pm$ 13	4.963	.121
DBP, mm Hg	84 $\pm$ 9	81 $\pm$ 9	3.224	.117
PSQI	5.4 $\pm$ 3.1	6.2 $\pm$ 3.4	-0.705	.296
SAQLI	4.5 $\pm$ 1.1	4.6 $\pm$ 1.1	0.032	.846
SF-36 PF	79.5 $\pm$ 21.8	87.0 $\pm$ 13.9	-5.335	.198
SF-36 RP	72.3 $\pm$ 40.3	78.8 $\pm$ 34.9	-6.859	.376
SF-36 bodily pain	70.9 $\pm$ 20.8	76.9 $\pm$ 19.2	-7.282	.094
SF-36 GH	67.1 $\pm$ 19.6	73.9 $\pm$ 16.4	-6.197	.091
SF-36 VT	62.2 $\pm$ 23.3	64.1 $\pm$ 18.4	-1.080	.791
SF-36 SF	83.8 $\pm$ 21.8	80.3 $\pm$ 20.5	3.189	.510
SF-36 RE	80.2 $\pm$ 32.8	79.8 $\pm$ 35.3	4.737	.518
SF-36 MH	84.0 (56-100)	81.3 (40-100)	2.571	.393
SF-36 PCS	47.7 $\pm$ 9.3	51.7 $\pm$ 8.1	-4.037	.028
SF-36 MCS	52.9 $\pm$ 8.4	50.7 $\pm$ 10.7	2.918	.180
CPAP adherence, <sup>b</sup> h/night	5.6 $\pm$ 1.7	5.4 $\pm$ 1.0	...	.490

# Outcomes of HST vs PSG I

Characteristic	PSG Arm (n = 37)				HM Arm (n = 33)			
	Baseline	4 Weeks	P Value	CI	Baseline	4 Weeks	P Value	CI
ESS	12.5 ± 5.0	6.4 ± 3.8	.0001	4.62; 7.70	13.0 ± 3.6	6.5 ± 3.8	.0001	4.93; 8.16
PSQI	8.56 ± 3.12	5.36 ± 3.13	.0001	2.03; 4.36	9.33 ± 3.78	6.15 ± 3.39	.0001	1.82; 4.54
SBP, mm Hg	135.0 ± 17.0	129.1 ± 11.3	.008	1.62; 9.92	130.3 ± 17.3	124.6 ± 12.6	.011	1.39; 10.18
DBP, mm Hg	87.0 ± 10.2	84.0 ± 8.5	.016	0.63; 5.60	84.0 ± 10.0	80.6 ± 9.0	.016	0.69; 6.16
SAQLI	4.14 ± 1.02	4.46 ± 1.13	.17	-0.77; 0.14	3.93 ± 0.94	4.55 ± 1.09	.020	-1.14; -0.10
SF36 VT	34.4 ± 20.2	62.2 ± 23.3	.0001	-33.86; -19.75	38.1 ± 21.3	64.1 ± 18.4	.0001	-36.4; -18
SF36 MH	71.9 ± 14.9	83.7 ± 10.4	.0001	-16.0; -6.9	71.0 ± 16.6	81.3 ± 14.9	.0001	-16.6; -6.0
SF36 MCS	44.3 ± 10.3	52.9 ± 8.4	.0001	-11.35; -4.45	43.1 ± 11.6	50.7 ± 10.7	.0001	-12.40; -4.20

# Outcomes of HST vs PSG II

- VA study with 106 consecutive patients referred for OSA evaluation
- Experimental arm had Watch Pat followed by APAP and traditional CPAP
- Control arm had split night study or PSG/titration

# Outcomes of HST vs PSG II

	Randomized PM-APAP	Randomized PSG	Completed PM-APAP	Completed PSG
Subjects	53	53	40	39
Age (years)	51.9 ± 1.7	55.1 ± 1.5	50.9 ± 1.8	54.8 ± 1.9
BMI (kg/m <sup>2</sup> )	34.0 ± 0.08	34.4 ± 0.9	35.2 ± 0.9	35.5 ± 1.8
Male/Female	46/7	47/6	34/6	35/4
Epworth Sleepiness Scale	16.6 ± 0.47	16.2 ± 0.54	16.4 ± 0.7	16.6 ± 0.6
No OSA by testing in randomized arm	4	6		
No OSA confirmed by crossover	3	4		
Crossover to other arm after diagnosis of OSA	1	2		
Crossover to other arm after CPAP titration	1	0		
OSA after crossover	51	48		
CPAP setups	45	43		

# Outcomes of HST vs PSG II

	Randomized PM-APAP	Randomized PSG	Completed PM-APAP	Completed PSG
Subjects	53	53	40	39
AHI	29.2 ± 2.3	36.8 ± 4.8	33.3 ± 3.8	39.8 ± 4.6
		27.8 ± 3.3 (based on TRT)		33.5 ± 3.7 (based on TRT)
Low SpO2 (%)	82.3 ± 0.9	84.5 ± 1.4	81.3 ± 4.0	83.6 ± 1.8
TST (min)	363.5 ± 12.4	167.4 ± 12.5		
Diagnostic satisfaction (2-10), higher better	6.5 ± 0.33	5.6 ± 0.7		

	<b>PM-APAP</b>	<b>PSG</b>
For those randomized:		
Number randomized	53	53
Number with OSA	51	48
Number CPAP setups	45	43
CPAP pressure (cm H <sub>2</sub> O)	11.2 ± 0.4	10.9 ± 0.5
Using CPAP at 6 weeks	40	39
% CPAP use of those with OSA	78.4%	81.2%
% CPAP use of those with CPAP setup	88.8%	90.6%
For those using CPAP at 6 weeks:		
Number using CPAP	N = 40	N = 39
Average night CPAP use (h/night)	5.20 ± 0.28	5.25 ± 0.38
% of nights > 4 h	71.7 ± 4.6	67.4 ± 6.4
Patients with > 4 h on 70% or more of nights		
Number:	24	22
% with OSA	(47% of 51)	(45.8% of 48)
% of CPAP setups	(53.3% of 45)	(51.1% of 43)

# Outcomes of HST vs PSG II

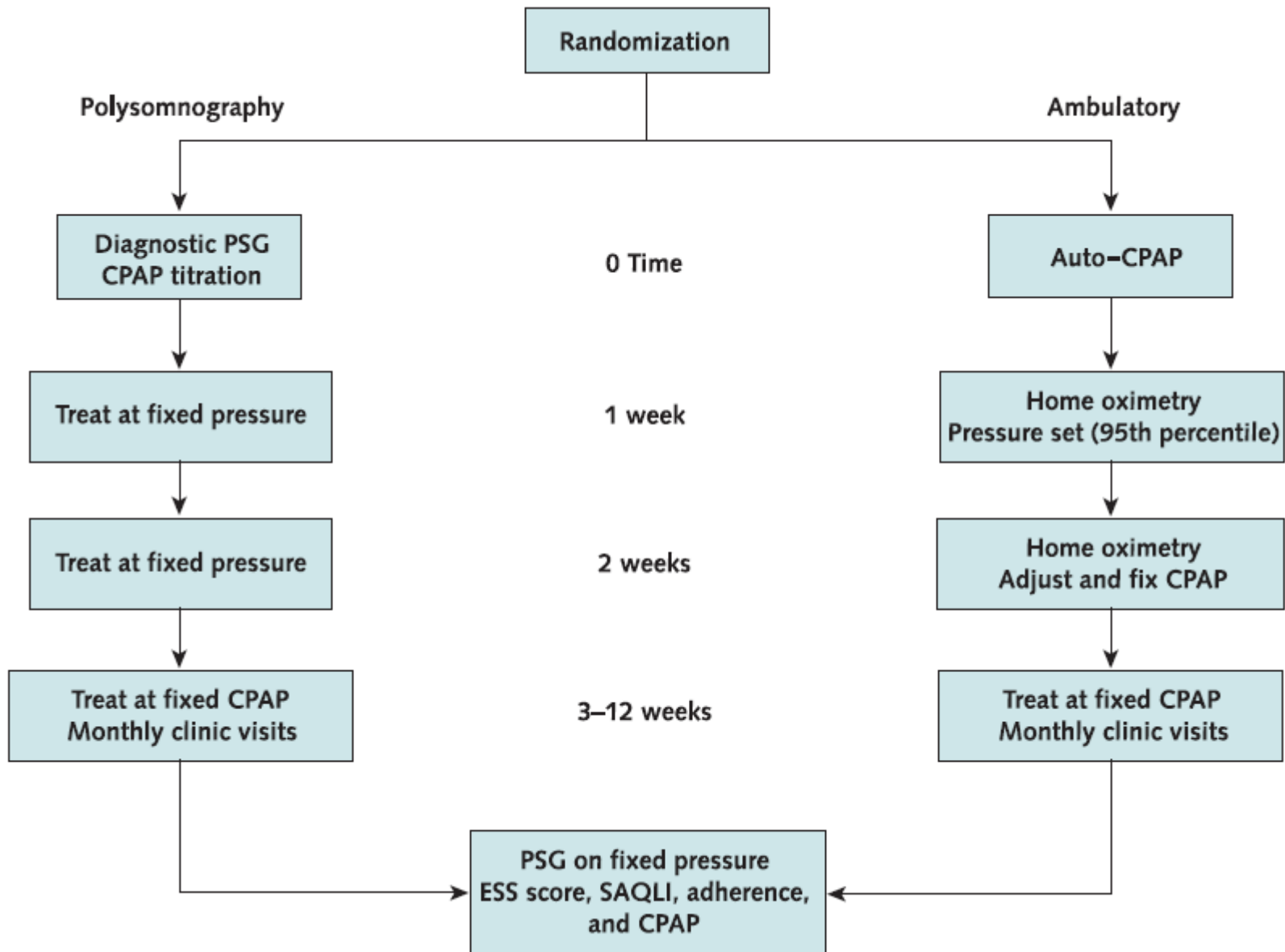
	PM-APAP	PSG
Change in ESS	$-6.50 \pm 0.71$	$-6.97 \pm 0.73$
Change in FOSQ	$3.10 \pm 0.05$	$3.31 \pm 0.52$
CPAP satisfaction Questionnaire (3-15), 15 most satisfied	$12.8 \pm 0.4$	$12.2 \pm 0.2$
Machine estimate of residual AHI (/hour)	$3.5 \pm 0.3$	$5.3 \pm 0.7$

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# Outcomes without PSG

- High pretest probability of OSA, medically stable, not taking sedatives
- Randomized to standard 2 night PSG or “ambulatory” treatment
- Ambulatory treatment was auto-cpap, oximetry, and subsequent fixed pressure CPAP therapy
- All patients had PSG on determined CPAP settings as well as ESS, SAQLI



Variable	Group	
	Polysomnography (n = 35)	Ambulatory (n = 33)
Mean age (SD), y	52 (11)	55 (10)
Men, %	75	79
Mean body mass index (SD), kg/m <sup>2</sup>	38 (8)	39 (9)
Median ESS score (interquartile range)	14 (11–19)	14 (12–16)
Median SACS (interquartile range)	30 (18–42)	32 (22–48)
Median RDI (interquartile range)	31 (21–47)	27 (17–57)
Median SAQLI (interquartile range)	2.8 (2.1–4.2)	3.5 (2.8–4.1)

\* The Epworth Sleepiness Scale (ESS) has a range of 0 to 24, and the Sleep Apnea Quality of Life Index (SAQLI) has a maximum score of 7. RDI = respiratory disturbance index; SACS = Sleep Apnea Clinical Score.

## Variable

## Outcome at 3 Months

Variable	Outcome at 3 Months	
	Polysomnography Group ( <i>n</i> = 30)	Ambulatory Group ( <i>n</i> = 31)
Median AHI (interquartile range), episodes/ <i>h</i>	3.2 (1.7 to 8.4)	2.5 (0.9 to 10.1)
Median ESS score (interquartile range)	5.0 (2.0 to 8.0)	5.0 (3.0 to 9.0)
Decrease of ESS score from baseline	10.0 (6.0 to 12.0)	8.0 (4.0 to 12.0)
Median SAQLI (interquartile range)	5.5 (4.8 to 6.2)	5.8 (4.9 to 6.3)
Increase of SAQLI from baseline	2.2 (1.2 to 3.4)	1.9 (1.1 to 3.0)
Median CPAP adherence (interquartile range), <i>h/night</i>	5.4 (3.7 to 6.4)	6.0 (5.1 to 7.1)
Mean CPAP (SD), <i>cm H<sub>2</sub>O</i>	11.2 (2.1)	12.1 (2.1)

# How good are prediction rules?

	sens	spec	+LR	-LR
Stop Bang <sup>1</sup>	92.9	43.0	1.62	0.17
Berlin <sup>2</sup>	54	97	16.62	0.47
Neural Network <sup>3</sup>	98.9	80	4.95	0.01