

BSS International Sleep Medicine Course 2026

15th - 18th September | Newcastle



British Sleep Society



UK Multidisciplinary Sleep Professionals



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SLAAP- EN WAAKONDERZOEK
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1. I do not have any potential conflicts to disclose.

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Type of Potential Conflict	Details of Potential Conflict
Grant/Research Support	
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Financial support	
Other	

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3. The material presented in this lecture has no relationship with any of these potential conflicts, **OR**

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- 1.
- 2.
- 3.

Workshop: Subjective Measures of Sleepiness

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Overview

1. Defining sleepiness
2. Developing measures of subjective sleepiness
3. Epworth Sleepiness Score

Sleepiness

Sleep is a physiological need

Sleepiness is the perception of the need to sleep – similar to hunger or thirst

Subjective measures score the perception of sleepiness

Perception is influenced by activity whereas physiological need for sleep remains constant

Objective measures assess physiological need for sleep

Sleepiness, tiredness, fatigue

Sleepiness

Irresistible sensation of needing to sleep & inability to maintain wakefulness

Excessive if occurs on an almost daily basis during normal waking hours and is sustained for months

Tiredness

Low energy levels and weakness

> A normal part of life and signals the need for rest/sleep

Fatigue

More pervasive and persistent than tiredness. A complete lack of energy, feeling run down, or apathetic

Sleepiness, tiredness, fatigue

Sleepiness + Tiredness = normal

If they occur inappropriately during periods of expected wakefulness they become an issue

Sleepiness	versus	Tiredness & Fatigue
<i>Inability to maintain wakefulness</i>		

Measuring the perception of sleepiness

Recognised for hundreds of years
e.g. Aristotle, Hippocrates

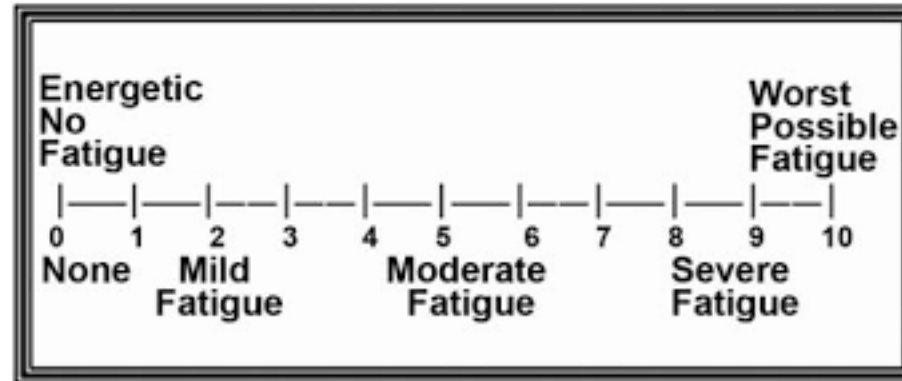
1970s – first methods of defining and measuring sleepiness

- Visual analogue scales
- Stanford sleepiness score

1991 – Epworth Sleepiness score published

- Overcame issues of earlier measures
- First measure to be used in routine clinical practice

Visual Analogue Scores



- Not standardized across centres
- Variable responses
 - Perception of sleepiness varies between individuals and within an individual depending on activity
 - Not specific to the behaviour of sleepiness

Stanford Sleepiness Score

Stanford Sleepiness Scale

Using the scale below, indicate the single number that best describes your level of alertness or sleepiness at each time:

- 1 = Feeling active, vital, alert, or wide awake
- 2 = Functioning at high levels, but not at peak; able to concentrate
- 3 = Relaxed, awake but not fully alert; responsive
- 4 = A little foggy
- 5 = Foggy, beginning to lose track; having difficulty staying awake
- 6 = Sleepy, woozy, fighting sleep; prefer to lie down
- 7 = Cannot stay awake, sleep onset appears imminent

- Measures sleepiness across the day
- First attempt at a measure of sleepiness perception
- Repeatable and sensitive
- Criticisms:
 - Contains multiple terms to describe different sleep states
 - Not simply a measure of sleepiness
 - Measuring two factors
 - Energy/vigor
 - Fatigue/sleepiness

9:30 a.m.	
11:30 a.m.	
1:30 p.m.	
3:30 p.m.	
5:30 p.m.	
7:30 p.m.	
9:30 p.m.	

Karolinska Sleepiness Score

- Measures sleepiness at a particular time in the day
- Compares well with EEG
- Driving simulator risk increased at scores of 8 and above
- Type of activity can mask sleepiness

—	1	Extremely alert
—	2	Very alert
—	3	Alert
—	4	Fairly alert
—	5	Neither alert nor sleepy
—	6	Some signs of sleepiness
—	7	Sleepy, but no effort to keep alert
—	8	Sleepy, some effort to keep alert
—	9	Very sleepy, great effort to keep alert, fighting sleep

Pittsburg Sleep Quality Index

- Standardised
- 19-item self-report questionnaire
- Measures sleep quality and disturbances
- Over 1 month

Ratings 0 to 3 – 3 indicated greatest dysfunction/disturbance

Total score is 0 to 21

Higher scores = poorer sleep quality,

Score >5 suggests significant sleep difficulties.

The Pittsburgh Sleep Quality Index (PSQI)

Instructions: The following questions relate to your usual sleep habits during the past month only. Your answers should indicate the most accurate reply for the majority of days and nights in the past month. Please answer all questions. During the past month,

1. When have you usually gone to bed? _____
2. How long (in minutes) has it taken you to fall asleep each night? _____
3. When have you usually gotten up in the morning? _____
4. How many hours of actual sleep do you get at night? (This may be different than the number of hours you spend in bed) _____

5. During the past month, how often have you had trouble sleeping because you...	Not during the past month (0)	Less than once a week (1)	Once or twice a week (2)	Three or more times a week (3)
a. Cannot get to sleep within 30 minutes				
b. Wake up in the middle of the night or early morning				
c. Have to get up to use the bathroom				
d. Cannot breathe comfortably				
e. Cough or snore loudly				
f. Feel too cold				
g. Feel too hot				
h. Have bad dreams				
i. Have pain				
j. Other reason(s), please describe, including how often you have had trouble sleeping because of this reason(s):				
6. During the past month, how often have you taken medicine (prescribed or "over the counter") to help you sleep?				
7. During the past month, how often have you had trouble staying awake while driving, eating meals, or engaging in social activity?				
8. During the past month, how much of a problem has it been for you to keep up enthusiasm to get things done?				
	Very good (0)	Fairly good (1)	Fairly bad (2)	Very bad (3)
9. During the past month, how would you rate your sleep quality overall?				

- Component 1 #9 Score..... C1 _____
- Component 2 #2 Score (≤ 15 min=0; 16-30 min=1; 31-60 min=2, >60 min=3) + #5a Score (if sum is equal 0=0; 1-2=1; 3-4=2; 5-6=3) C2 _____
- Component 3 #4 Score (> 7 =0; 6-7=1; 5-6=2; <5=3) C3 _____
- Component 4 (total # of hours asleep)/(total # of hours in bed) x 100
>85%=0, 75%-84%=1, 65%-74%=2, <65%=3 C4 _____
- Component 5 Sum of Scores #5b to #5j (0=0; 1-9=1; 10-18=2; 19-27=3)..... C5 _____
- Component 6 #6 Score C6 _____
- Component 7 #7 Score + #8 Score (0=0; 1-2=1; 3-4=2; 5-6=3)..... C7 _____

Add the seven component scores together _____ **Global PSQI Score** _____

Buysse, D.J., Reynolds III, C.F., Monk, T.H., Berman, S.R., & Kupfer, D.J. (1989). The Pittsburgh Sleep Quality Index: A new instrument for psychiatric practice and research. *Journal of Psychiatric Research*, 28(2), 193-213.

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Issues

- Lengthy
- No unified definition of "sleep quality"
- Doesn't work as well across certain populations e.g. athletes, older adults
- Recall bias as have to remember over 1 month period – questionnaire vulnerable to memory errors and negative emotional bias

Epworth Sleepiness Scale

Developed 1990 by Dr Murray Johns

Eight everyday situations

Each item scored 0–3

Total score: 0–24

Takes approximately 2–3 minutes

Higher scores indicate greater average sleep propensity / daytime sleepiness

Epworth Sleepiness Scale

- Focusses on the behaviour of sleepiness in different settings
 - > Different settings provide a frame of reference
- High internal consistency and moderate repeatability
- Still subjective - different individuals rate their likelihood to sleep differently
- Important to ensure that it is correctly administered

Epworth Sleepiness Scale - ESS

How likely are you to fall asleep in the following situations?

0	Would never doze
1	Slight chance of dozing
2	Moderate chance of dozing
3	High chance of dozing

Situation

Sitting and reading

Watching TV

Sitting inactive in a public place
(e.g. movie theatre or a meeting)

As a passenger in a car for an
hour without a break

Lying down to rest in the afternoon
when circumstances permit

Sitting and talking to someone

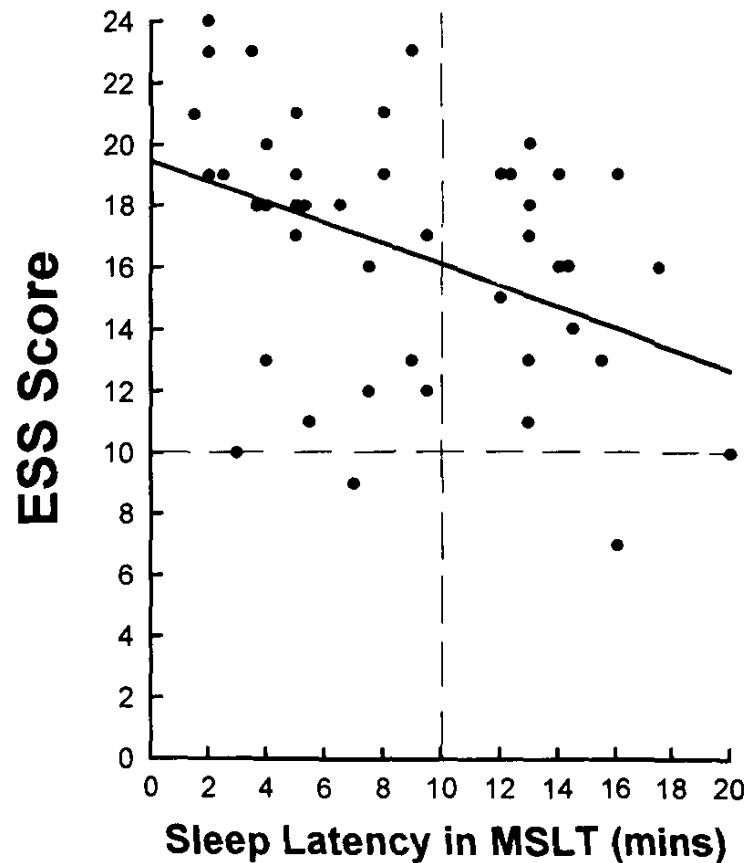
Sitting quietly after lunch

Sitting quietly after lunch

Epworth Sleepiness Scale

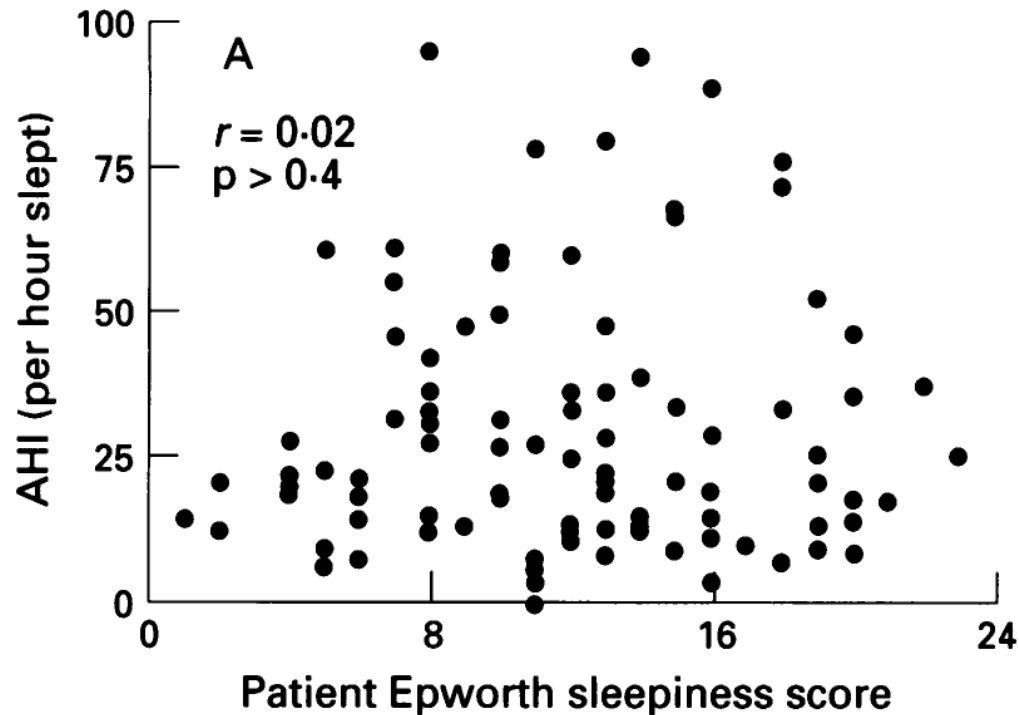
- Highly correlated to EEG and behavioral variables
- Poor correlation with objective sleep propensity measures with the Multiple Sleep Latency Test
- Good instrument to judge excessive daytime sleepiness over a longer observation period
- ESS can also mirror individual changes over time by treatment
 - > Defined minimal clinical important difference (2-3 points)
- Translated and validated in multiple languages
- Available and valid in picture form

ESS and MSLT correlation



- Mixture of patients with narcolepsy, idiopathic hypersomnolence, PLMS and OSA
- Modest correlations of -0.42 and -0.60 in two different sets of patients
- At best explains only 40% of the variance in MSLT

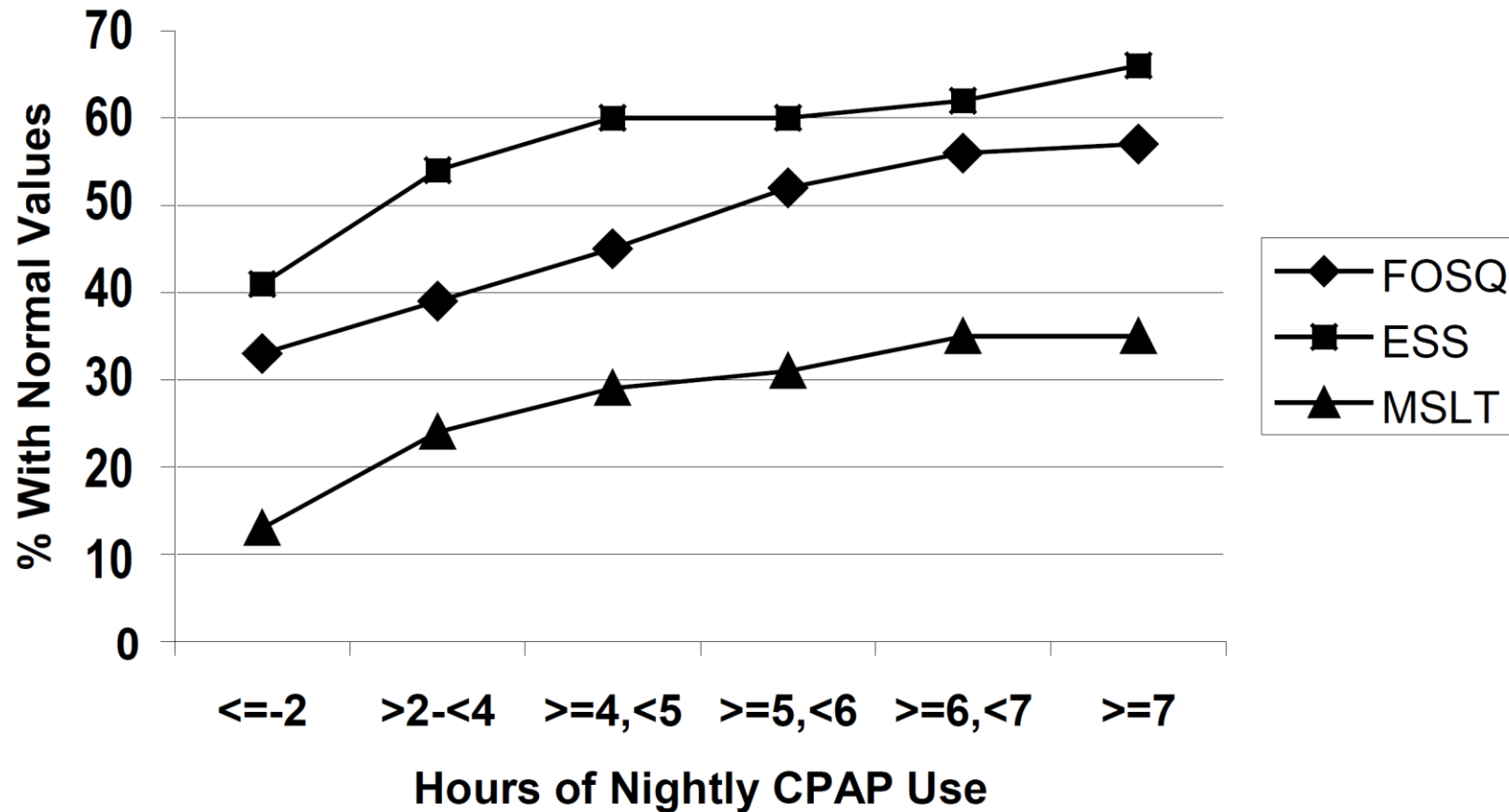
Correlation with disease severity



Weak or no correlation between sleep apnoea severity and ESS

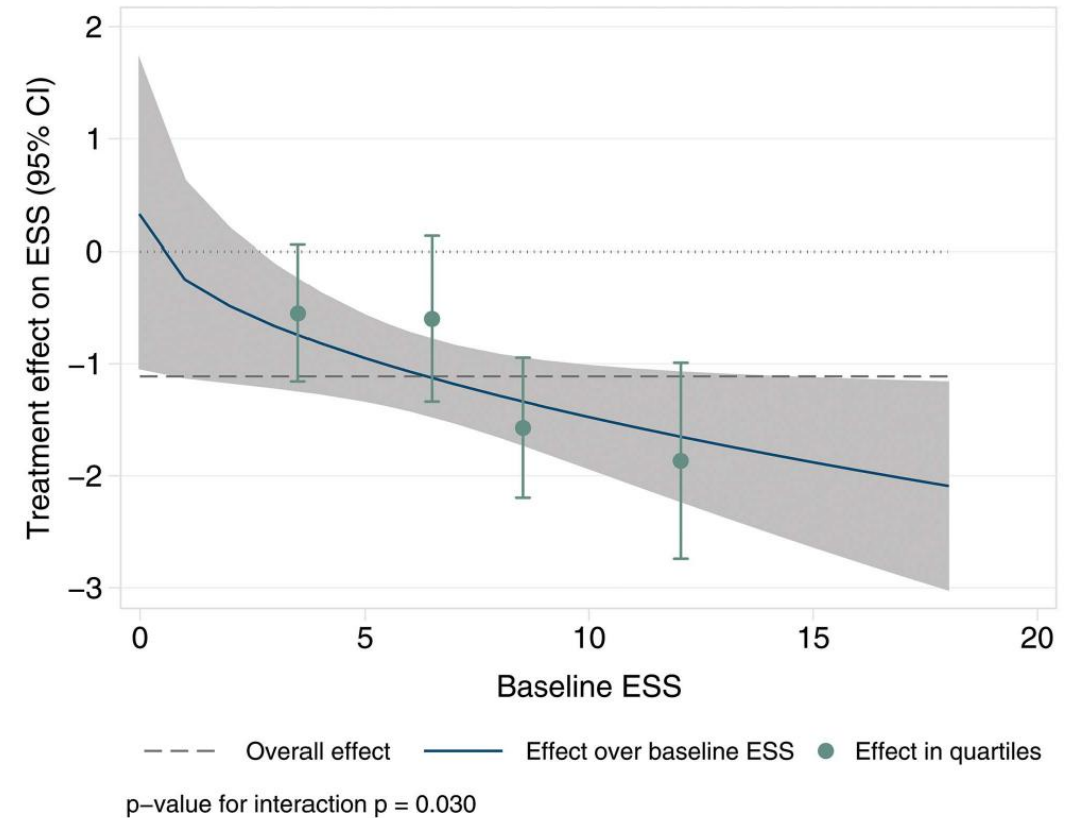
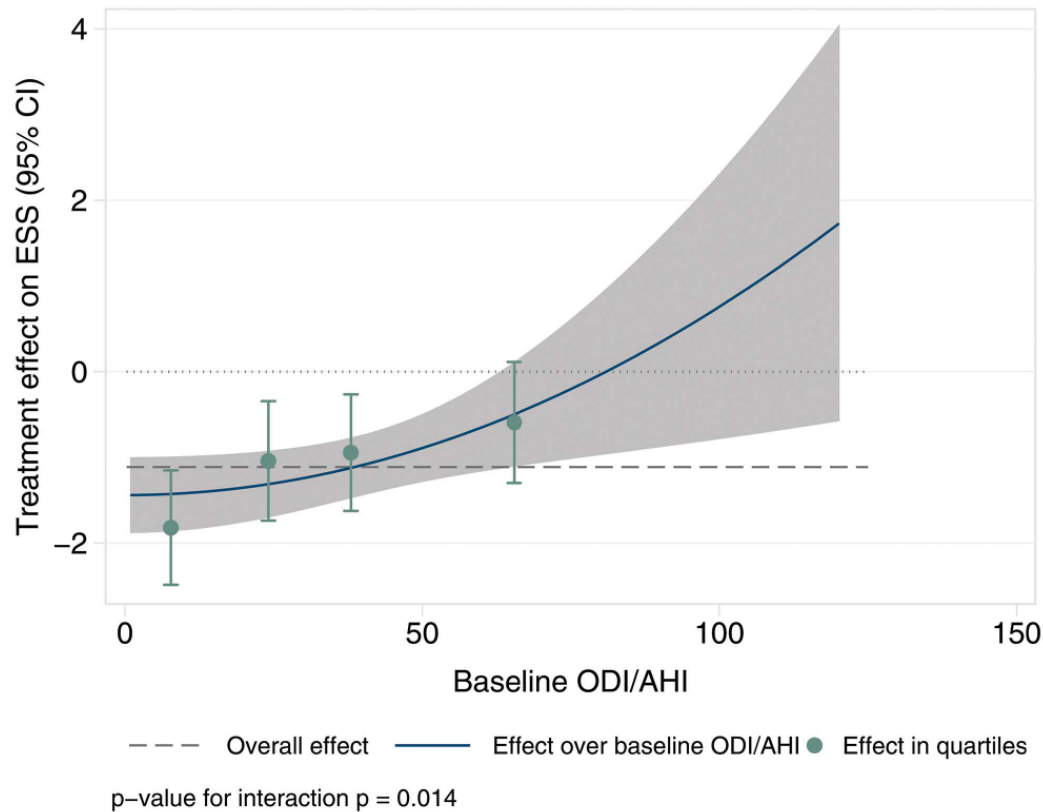
Modest correlations between ESS and PSG changes in narcolepsy/symptoms of narcolepsy

ESS normalises with increasing CPAP therapy



*Symptoms improve
with increased
CPAP usage*

ESS Lowered by CPAP across disease spectrum



ESS Limitations

Not suitable to make assessments on its own

Does not distinguish the cause of sleepiness

Not suitable in those with cognitive impairment

Technically not valid when completed by interview

Technically not valid if any question incomplete

Case 1

58yo man

BMI 34

PMH: hypertension, AF

Collateral: loud snoring, gasping

ESS: 5/24

Sleep study: AHI 48/hour

Case 1

Under reporting

- Patient may under-recognise or normalize sleepiness
- Patients may not feel sleepy
- ESS is subjective rather than objective of OSA severity

ESS $\neq$ objective disease severity

Treat the patient and the disease, not the ESS score

Case 2

32yo woman

BMI 23

ESS 17/24

Symptoms: daytime sleepiness, difficulty concentrating,
occasionally falling asleep at work

Collateral: sometimes snores

Sleep study: AHI 2/hour

Case 2

Missing history: sleeps 5-6 hours per night because of shift work / caring responsibilities

ESS identifies sleepiness, but does not establish the cause

Case 3

67yo man

Has diagnosis of severe OSA with AHI 52/hour, nocturnal hypoxaemia, hypertension

Initial ESS 15/24

Starts CPAP > improvement in symptom burden, ESS now 6/24

CPAP data – incomplete control of respiratory events, residual AHI 12/hour, significant mask leak, remains hypertensive

Case 3

Subjective sleepiness has improved

> but this does not mean the underlying SDB has been adequately controlled

ESS does not measure: AHI, oxygenation, CPAP control

Improvement in ESS does not mean OSA adequately treated

Case 4

45 year old man

BMI 37

Occupation: HGV driver

Symptoms: loud snoring, apnoeas, morning headaches

Collateral: falls asleep on sofa every evening

ESS 7/24

Sleep study: AHI 38/hour

Case 4

Patients may under-report sleepiness due to employment concerns

Collateral is important and can reveal clinically important sleepiness that ESS misses

Case 5

60yo woman

BMI 33

Diagnosis: Severe OSA initial AHI 45/hour and ESS 16

After 6 months good use

- residual AHI 2/hour, minimal leak, av 7h/night
- ESS 13/24

Case 5

Persistent high ESS despite adequately controlled OSA

> re-assess

Sleep quantity, medication use, comorbidity e.g. depression, coexisting sleep disorder e.g. circadian disorder, restless legs.....

Persistent sleepiness with effective OSA treatment requires search for another cause