Women and OSA

New Brunswick Association
of Respiratory Therapists
L'Association des thérapeutes respiratoires
du Nouveau-Brunswick

Are men from Mars and women from Venus ?

ResMed

Conflict of Interest Disclosure

I am employed by ResMed, manufacturer of medical equipment in the diagnosis and treatment of sleep-disordered breathing and hypoventilation

Objectives

- OSA has traditionally been a man's disease
- Mismatch between prevalence and diagnosis in women
- Are there gender differences in OSA ?
  - Anatomy & physiology
  - Signs & symptoms
  - Behavioral
  - Specific PSG characteristics in women
- Impact of differences on OSA care in women
- Should women be treated differently ?
- References:
  - M Kryger et al, SLEEP 2007
  - T Young et al., 1996
  - Ancoli-Israel et al., Med Review 2008
  - ResMed – 'OSA & Women' by Wimms et al., 2014

Intro

- When OSA was first defined it was traditionally seen as a male disease
- For the first 20 years 75% of studies were conducted on men
- Terry Young (1993); 1st epidemiological study which icluded women
- Studies in th m 10:1 to 60:1

Table 1—Examples of general population studies in sleep apnea

First author	Year	Men (No)	Women (No)
Lavie[68]	1983	1962	0
Peter[69]	1985	354	0
Telakivi[70]	1987	1939	0
Gislason[71]	1988	3210	0
Cirignota[72]	1989	1170	0
Stradling[73]	1991	893	0
Haraldson[74]	1992	846	0
Young[17]	1993	352	250
Olson[75]	1995	1233	969
Ohayon[45]	1997	2078	2894
Kripke[76]	1997	165	190

Epidemiology

- OSA – general population (n = 1520)*

AHI ≥ 15	Men (%)	Women (%)
30 – 49 yo	10	3
50 – 70 yo	17	9

- Before menopause, risk of sleep apnea is 3:1 ratio of men vs. women
- After menopause risk is ~ 2:1[3]
- Prevalence ~ 2/3:1
- Clinical diagnosis: ~4:1 to 8:1

Why the mismatch ?

*Peppard et al Am J Epidemiol. 2013; 177(9):1006-1014
Young, T, NEJM, 1993
**Dancey, D.R., et al., Impact of menopause on the prevalence and severity of sleep apnea. Chest, 2001. 120(1): p. 151-5
***Tremollieres, F.A., J.M. Pouilles, and C.A. Ribot, Relative influence of age and menopause on total and regional body composition changes in postmenopausal women. Am J Obstet Gynecol, 1996.

Why women may be underdiagnosed/misdiagnosed

<u>Women may be less frequently referred for sleep studies:</u>

Signs & symptoms:

- Women may not have ‘classic’ symptomology

Behavioral differences:

- Women complain of sleepiness differently than men

Myth about OSA & women

- Misconception about mostly men having OSA

Differences in OSA between men & women

Anatomy & physiology:

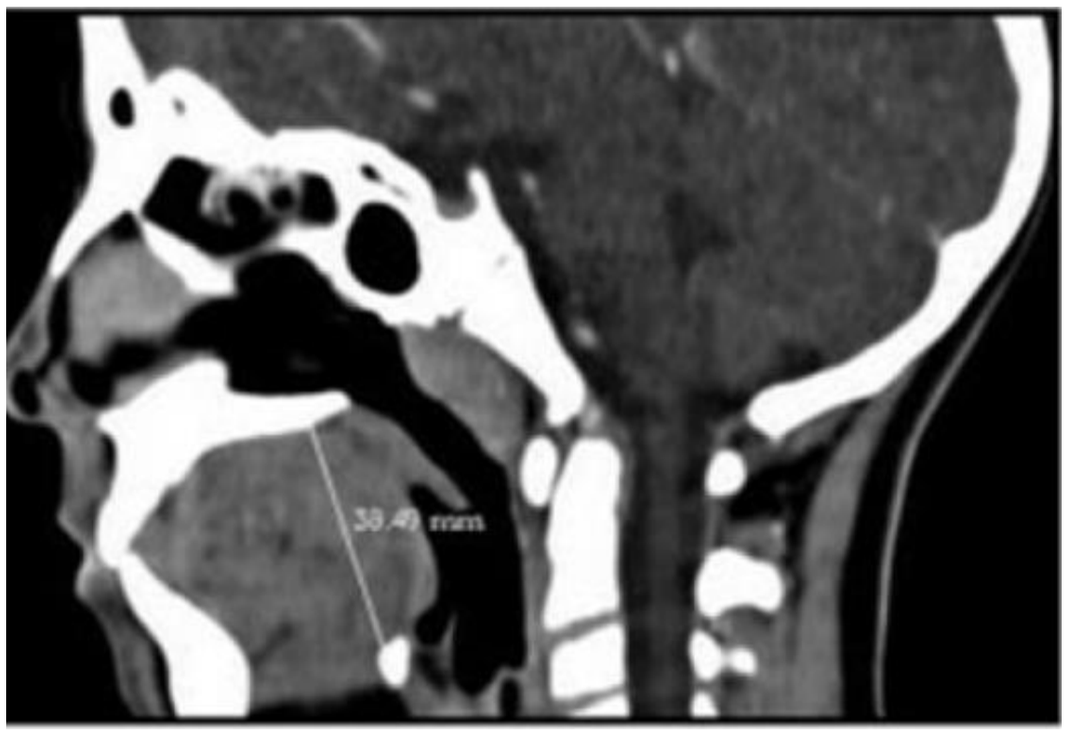
- Obesity & fat distribution
- Hormones

Clinical picture:

- Signs & symptoms
- Behavioral differences
- Specific PSG characteristics in women

Anatomical differences

Men



Women

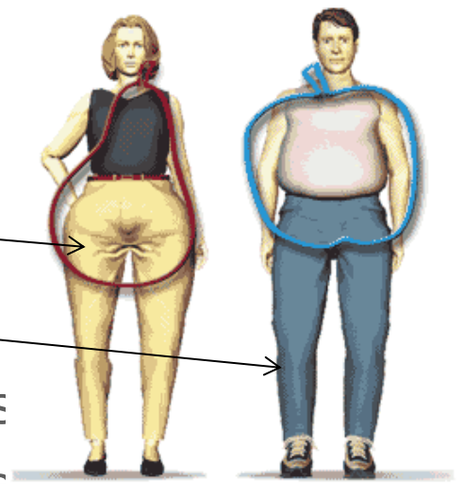
Anatomy & pathophysiology

Upper airway anatomy - MRI imaging[1,2]:

Women	Men
↓ Oropharyngeal length ↓ tongue volume (12% larger than women) ↓ soft palate ↓ soft tissue in UA	↑ Oropharyngeal length ↑ tongue volume (12% larger than women) ↑ soft palate ↑ soft tissue in UA

Impact of menopause – fat distribution in women

- Women generally have increased fat post menopause
- Premenopause: Gynoid obesity
- Postmenopause: Android obesity



- N=12,219; These data combined indicate that menopause is a significant ris

sleep apnea in women and that hormone replacement appears to be associated with reduced risk[3]

1. Malhotra, et.al, Am J Respir Crit Care Medicine 2002

2. Anttalainen, et al., Sleep Breath 2013

3. Bixler et. Al, *Am J Respir Crit Care Med 2001*;163(3 Pt 1):608-613

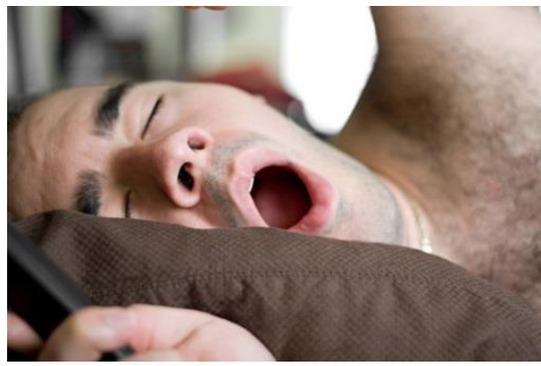
Anatomy & physiology

- Pre-menopausal risk of OSA=post-menopausal (w HRT)[1]
- Hormones: May be due to hormones, progesterone & estrogen
  - Progesterone:
    - Known respiratory stimulant
  - Estrogen:
    - ↑ UA muscle activity of dilator muscles (genioglossus)

*Dancey, D.R., et al., Impact of menopause on the prevalence and severity of sleep apnea. Chest, 2001. 120(1): p. 151-5
**Tremollieres, F.A., J.M. Pouilles, and C.A. Ribot, Relative influence of age and menopause on total and regional body composition changes in postmenopausal women. Am J Obstet Gynecol, 1996.
1.Bixler EO, et. Al, Am J Respir Crit Care Med 2001

Signs & symptoms

- **Both men & women present with “typical” OSA symptoms**
  - *Snoring
  - *Witnessed apneas
  - Daytime sleepiness



- **Women may present with different symptoms, causing misdiagnosis***
  - Insomnia
  - Restless legs
  - Fatigue / daytime sleepiness
  - Depression
  - Headaches, muscle pain & palpitations

Menopausal symptoms !

- **Women more apt to complain of vague/non-specific symptomology****

*Valipour, A., et al., Sleep, 2007
**Lin, C.M., T.M. Davidson, and S. Ancoli-Israel, Sleep Med Rev, 2008.

Signs & symptoms

- **EDS:**
  - Despite reporting similar rates of daytime sleepiness as men, women are less likely to have an Epworth Sleepiness Scale (ESS) score of >10, meaning that this popular screening tool may be less sensitive in women[1]
  - It is also possible that women may have a different threshold for feeling sleepy and/or complain differently about sleepiness compared to men[3]
  - The Epworth scale may not be as accurate a screener for women ?

1.Baldwin et al, Sleep 2004
2.Young et al, Arch Intern Med, 1996
3..Ancoli-Isreal et al., 2008

Behavioural differences between men & women

- Men are more often accompanied by their partner, whereas women tend to see their physicians alone[1]
- Women tend to use different language to describe their symptoms
- Women tend to be less apt to complain of sleepiness & snoring (less feminine)

1.Quintana-Gallego, E., et al., Respir Med, 2004

Pregnancy & OSA

Pregnancy (normal state)

Click on the buttons if wishing to learn more about these risk factors (additional content).

- Substantial increase in snoring
- Changed pulmonary mechanics
- Pharyngeal edema
- Nasal patency reduction
- Neck circumference enlargement

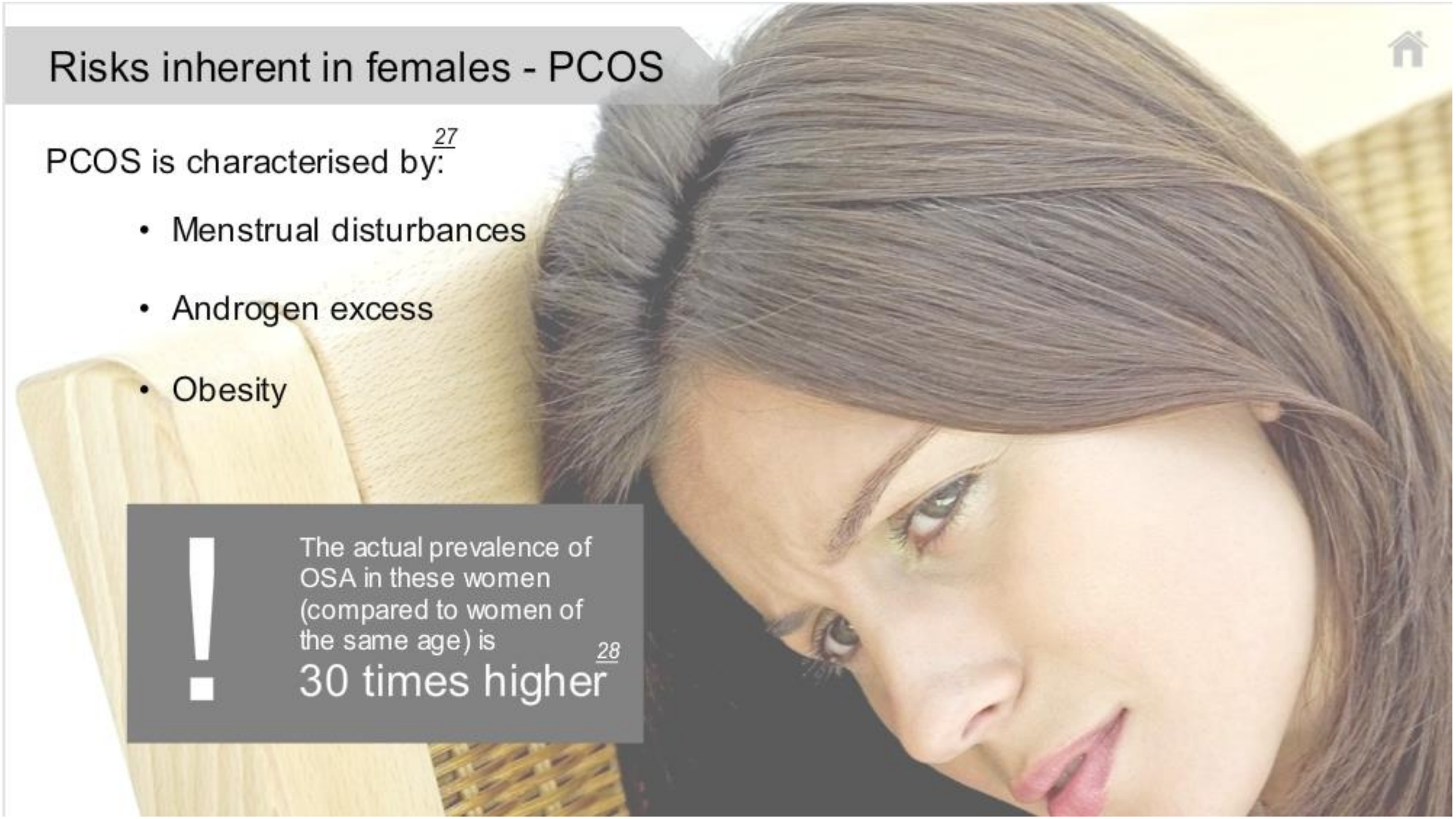
Click NEXT to continue.

PCOS & OSA

Risks inherent in females - PCOS

PCOS is characterised by:[27]

- Menstrual disturbances
- Androgen excess
- Obesity



! The actual prevalence of OSA in these women (compared to women of the same age) is 30 times higher[28]

Summary of differences

Table 3—Clinical differences between male and female OSAS patients

Symptoms	Males	Females
Snoring, gasping, observed apnea[19,44]	+++	+
Sleepiness[19,44]	+++	++
Morning headaches[19]	+	+++
Features of depression[19,43]	+	++
Obesity		
BMI[35,36]	++	+++
Upper body fat distribution[52,54,55]	+++	+
Hormonal status and apnea prevalence		
Male vs. premenopausal female[42]	+++	+
Male vs menopausal female[42]	+++	++
Male vs menopausal female on HRT[42]	+++	+
Craniofacial features		
Retrognathia[35]	+	+
Posterior airway space[35]	+	+
Enlarged tongue[77]	++	+
Long soft palate[35,77]	++	+
Inferior position of hyoid bone[35]	+	+
Co-morbidities		
Arterial hypertension[9]	+	+
Ischemic heart disease[43]	++	+
Depression[43]	+	++
COPD[35,43]	+	++
OHS.[31,32,64,65]	+	+
PSG Findings		
Apnea frequency[37,66]	++	+
Hypopnea frequency[36]	+	++
Length of apnea episodes[36,66]	++	+
Oxygen desaturation[66]	++	+
NREM apneas frequency[66]	++	+
REM apneas frequency[67]	+	++
Arousal frequency[37]	++	+

The number of +s is a qualitative index comparing findings in males and females. For example BMI is greater in females with OSAS than in males, but upper body fat distribution is more common in males with OSAS.

Kapsimalis & Kryger, SLEEP 2002

Impact of differences on women's care ?

Stage in the patient's process	Characteristic of OSA in women	Impact on care
GP screening	• Signs & symptoms are different (less 'classic')	• Less apt to screen women for OSA • More apt to misdiagnose or underdiagnose OSA
Diagnosis	• Lower AHI & more UARS • Shorter events • REM clusters	• Scoring UARS & short events in level 3 • Usually scored in labs • Don't underestimate severity of OSA by missing the early morning hours of sleep
Therapy & compliance	• ↑ UAR & flow limitations • ↑ events in REM	• Fixed pressure may be insuffcient to treat UARS • Does the Auto algorithm respond to FL's? • Auto modes could cause fluctuations in pressure • Encourage women to wear therapy until the morning
Follow-ups & downloads	• Signs & symptoms • Shorter obstructive events • RERA's & FL's	• Are the signs & symptoms relieved? • Can compromise AHI calculation • RERA estimates in downloads

Objectives

- How common is OSA in women ?
  - Less than men pre-menopause but ~equal post-menopause
- Is OSA in women misdiagnosed or under-diagnosed ? Absolutely!
- If so , Why ?
- Are there gender differences in OSA:
  - Diagnosis Lower AHI, UARS, womens' behavior
  - Anatomy & physiology Shorter UA, hormone protection pre-menopause
  - Signs & symptoms Less snoring, fatigue, headaches, depression
  - Health consequences of OSA Cardiovascular & mortality
  - Specific OSA characteristics in women UARS, shorter events, REM clusters
- Should women be treated differently ? Personalized medicine, AutoSet for Her in your toolbag

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THANK YOU & SWEET DREAMS!