Emerging Nursing Roles in Collaborative Management of Sleep Disordered Breathing and Obstructive Sleep Apnoea

Sigma Theta Tau International
28th International Nursing Research Congress
27-31 July 2017 Dublin, Ireland

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Sleep perchance to ….

- *“Sleep that knits up the raveled sleave of care,*
  The death of each day's life, sore labor's bath,
  Balm of hurt minds, great nature's second course,
  Chief nourisher in life's feast.

  William Shakespeare, Macbeth Act 2. Scene 2

Key Function of Sleep

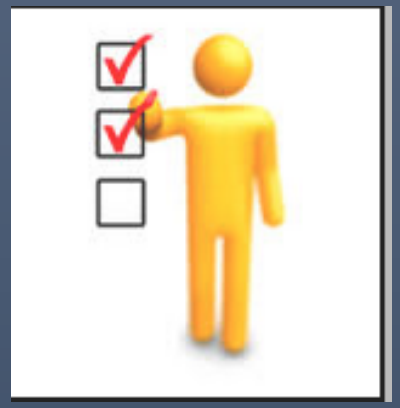
- Consolidates memory
- Helps regulate immune function
- Cerebral restoration
- Body and vascular/ tissue restoration

Sleep Disordered Breathing : Problems and clinical patient presentation

- Noisy sleep snoring, gasping, grunting
- Broken sleep, partial awakenings (sleep arousals)
- Bed-partner sleep disturbance
- Sleep Bruxism movement
- Restless Leg Movement (RLM)
- Gastric Esophageal Reflux Disorder GERD

Who's at Risk of Sleep Disordered Breathing ?

- Current prevalence
  - 5-10-17% Sleep apnea
  - 40-50% Snoring
  - 30% in Sleep bruxism (8%)



- Screening
  - Epworth sleepiness scale (ESS) Questionnaire
  - STOP-BANG questionnaire
  - Berlin questionnaire
- Disruption
  - Bed-partner / Observer reporting

Peppard PE, Young T et al Increased Prevalence of Sleep-Disordered Breathing in Adults Am J Epidemiol 2013 1:177(9) 1006-1014

Spectrum and Severity of Most Common Obstructive Upper Airway Breathing Disorders

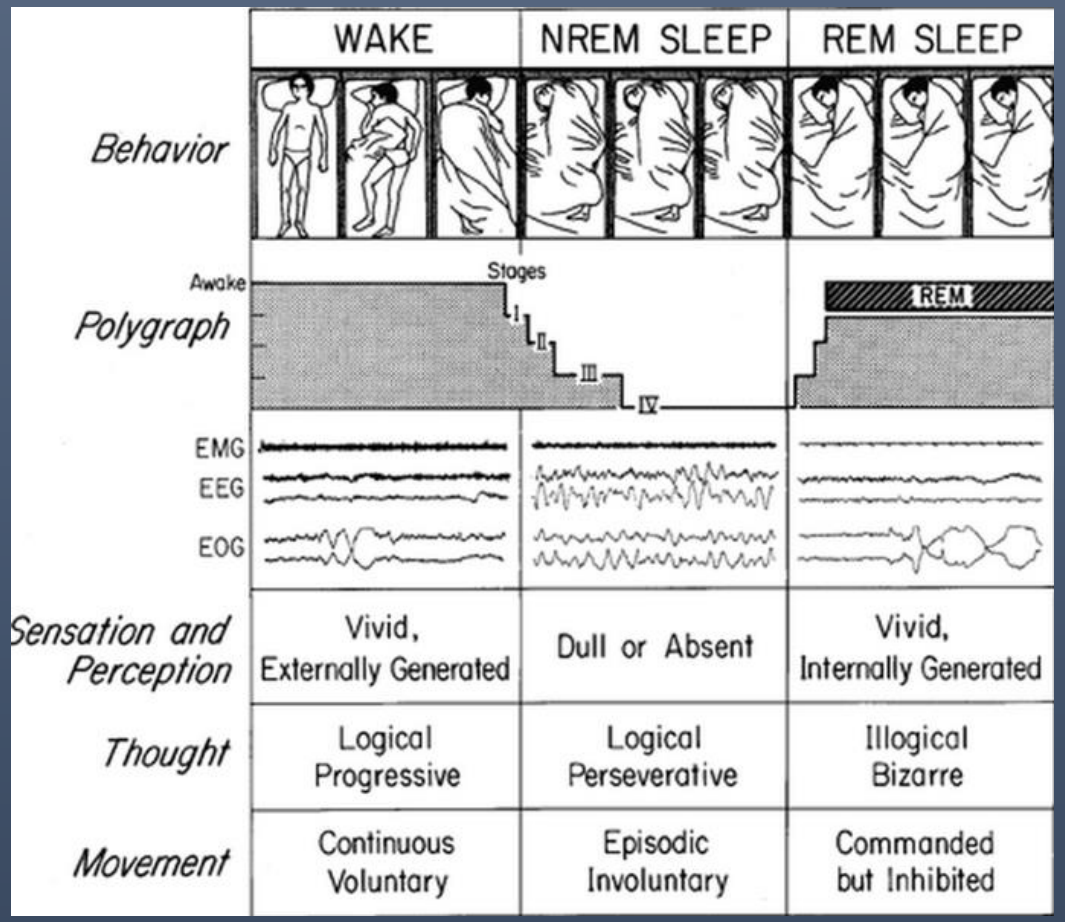
- Snoring → Upper Airway Resistance Syndrome (UARS)
- UARS → Obstructive Sleep Apnoea Mild (OSA)
- OSA Mild → Moderate → Severe
- Simultaneous → Sleep Bruxism / RLM / GORD

SLEEP DISORDERED BREATHING or OBSTRUCTIVE SLEEP APNOEA?

- A Sleep Disordered Breathing (SDA) complaint
- APNEA = a reduction in airflow of >90% from baseline and lasting >10 seconds
- HYPOPNEA = a reduction in airflow of 30-50% from baseline and lasting >10 seconds followed by arterial desaturation > 4 or 3%
- Frequency of events determines severity of condition, which results in brief arousals from sleep
- 3 Types of Sleep Apnoea
  - Central
  - Obstructive (*Most common)*
  - Mixed

    - International Classification of Sleep Disorders 3rd Edition American academy of Sleep Medicine 2010

SLEEP : Stages and Sleep Study Diagnostics



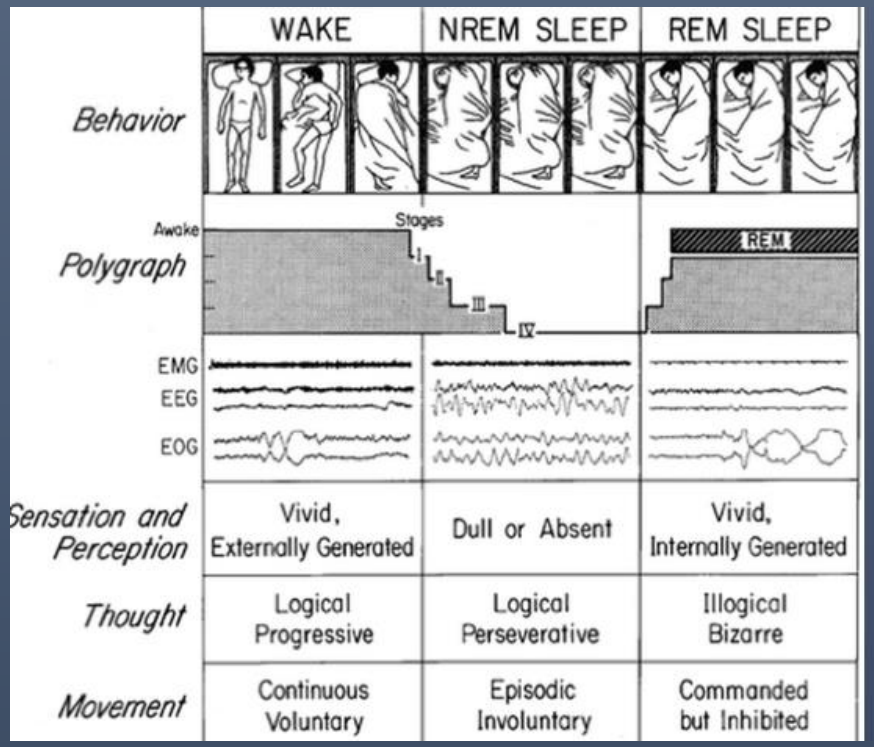
MIT Encyclopedia of Cognitive Science

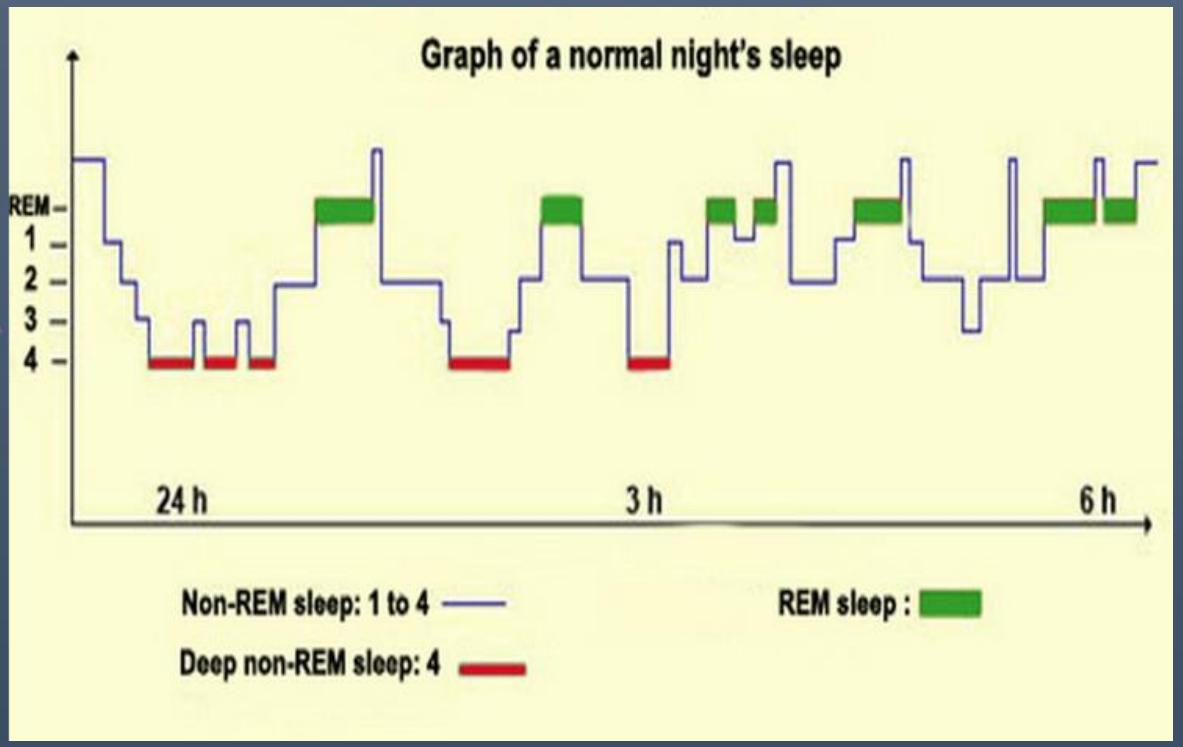
Polysomonography (PSG)

Out of centre sleep test (OCST)

Track events within sleep
90 minute cycles

Sleep Cycles Construct : NREM / REM Sleep





MIT Encyclopedia of Cognitive Science

Hypnogram showing 5-6 90 Minute NREM-REM Cycles per night

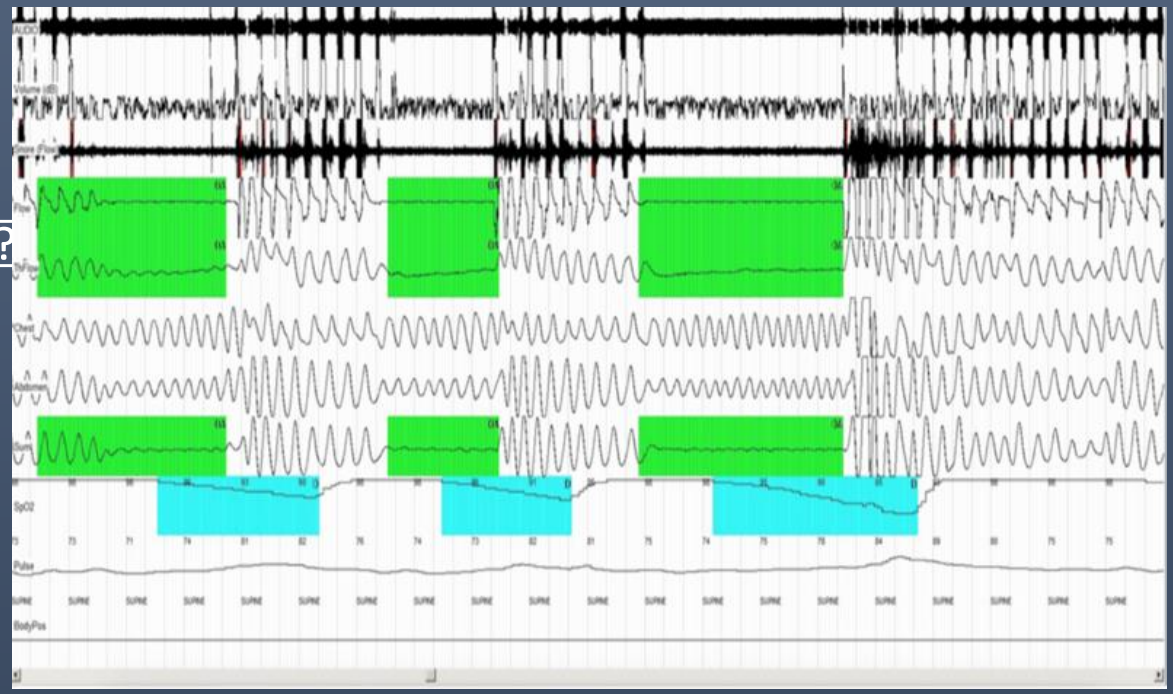
SLEEP STUDY – Records and Scores Sleep Disordered Breathing – *Repetitive* Events

- **AHI** = Apnea Hypopnea Index
- 5>15>30 Events/hr *Mild>Moderate>Severe*

- **RDI** = Respiratory Disturbance Index
- 10>20>40 Events/hr *Mild>Moderate>Severe*

- **ODI** = Oxygen Desaturation Index
  - No of times below baseline/hr

- **Differential Diagnosis**



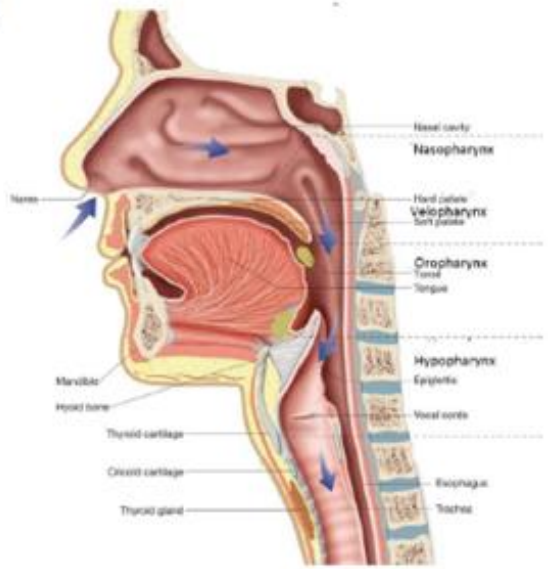
Classifying Sleep Disordered Breathing

- **DIFFERENTIAL DIAGNOSIS**
  - **Obstructive Sleep Apnea (OSA) ,** Central Sleep Apnea (CSA), Mixed Sleep Apnea, or Hypopnea events resulting in sleep fragmentation.
- **APNEA**
  - 90% or reduction of airflow >10 seconds due to complete collapse of the airway
- **HYPOPNEA**
  - Reduction of pressure airflow between 30-50% for >10 seconds with oxygen desaturation of > 4or 3 % respectively with continued respiratory effort and possible sleep arousal

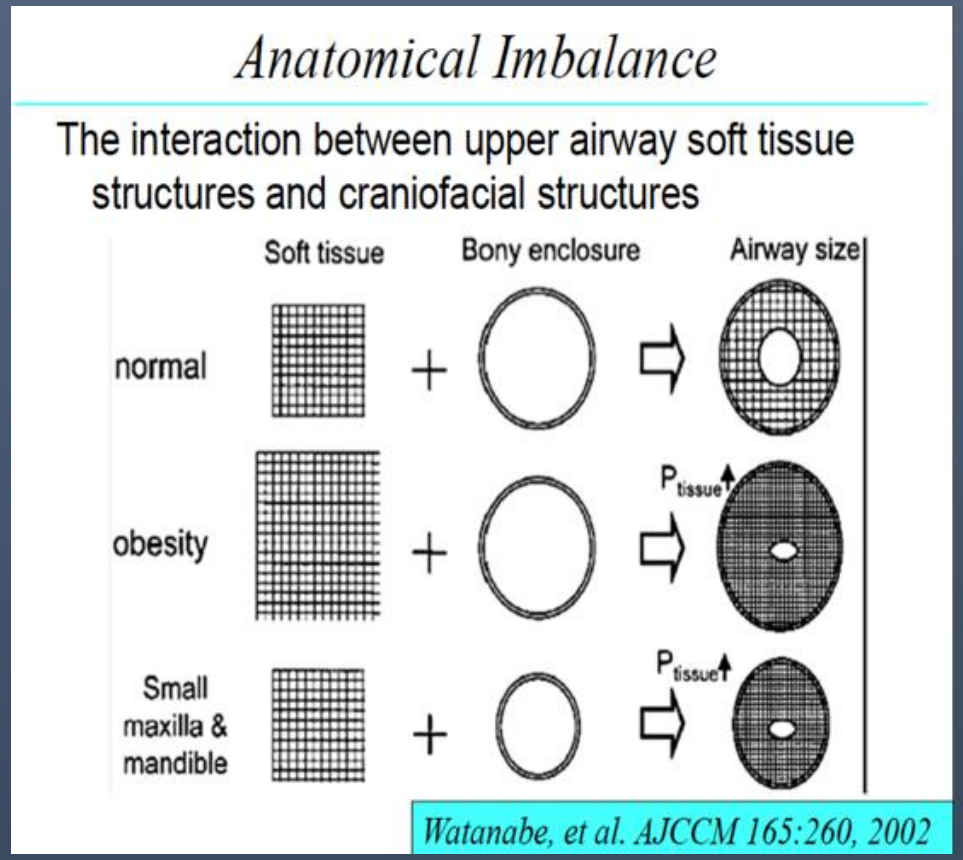
Obstructive Sleep Apnea (OSA) Anatomy

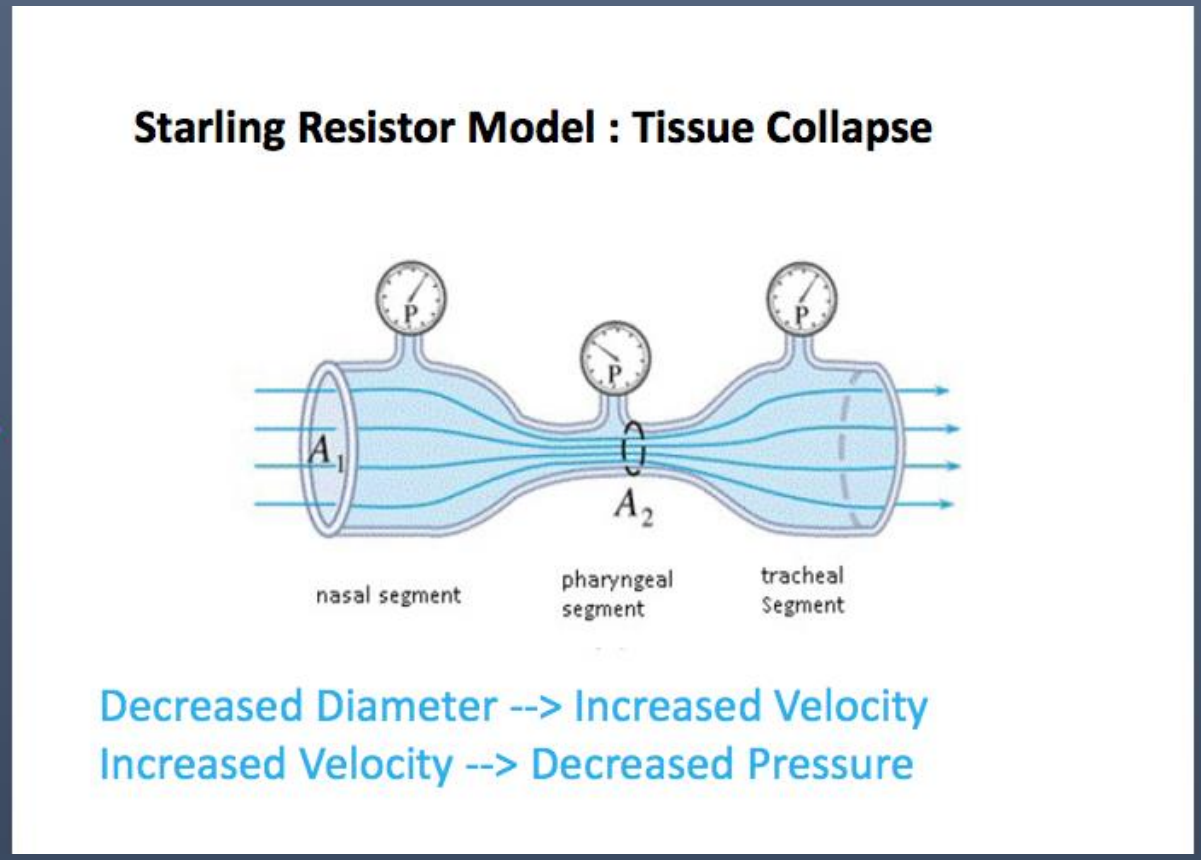
Anatomic factors affecting airway

- Large tongue (scalloping)
- Long soft palate
- Tonsils or adenoids
- Retrognathia
- Large neck (fat bagel)
- Obesity
- Retro-positioned maxilla
- Inferiorly positioned hyoid bone

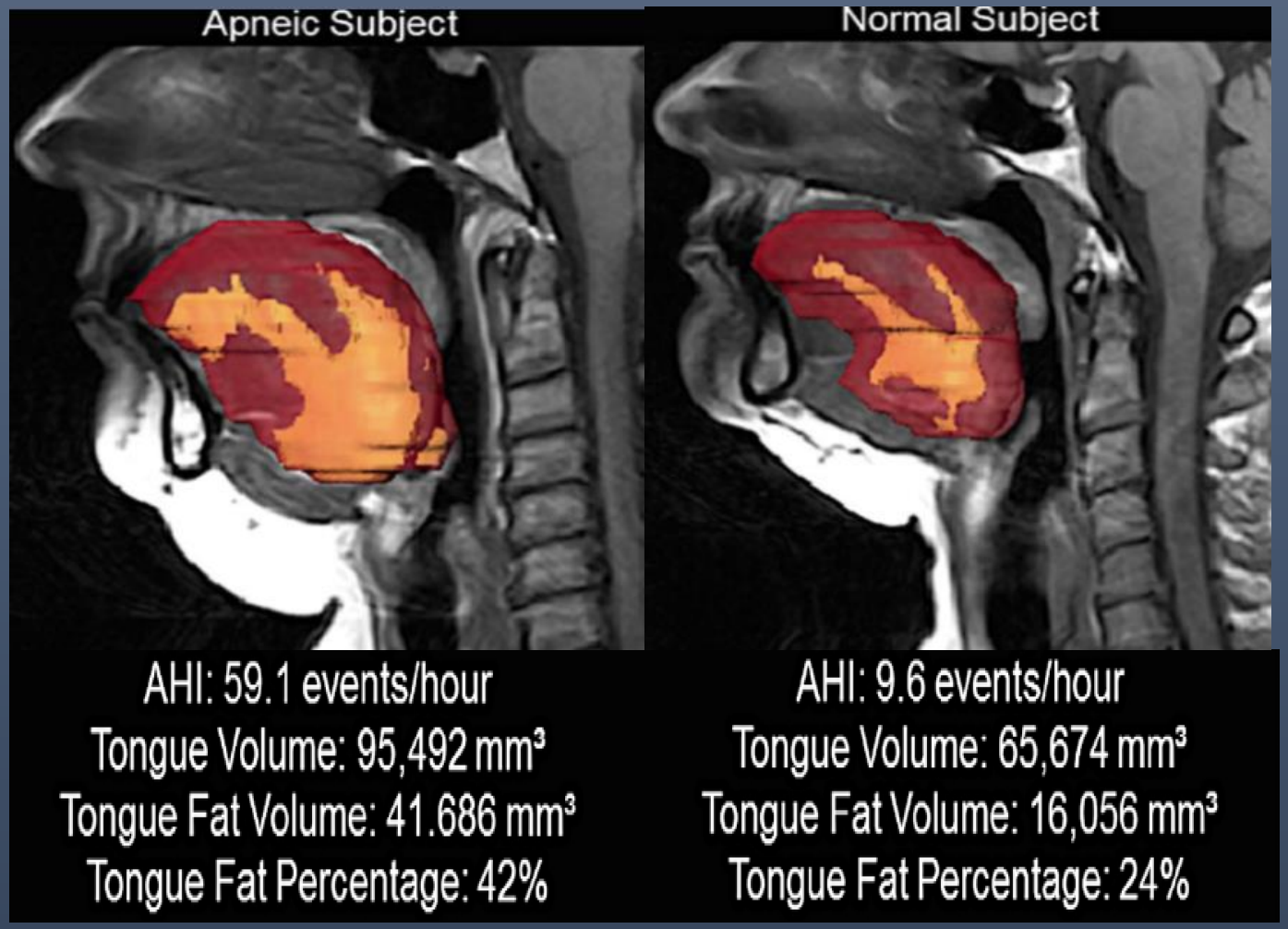


Airway Anatomy and Airflow





Tongue Fat Significance



Tongue fat distribution in apneics is increased in specific locations of the tongue (greater in the retro-glossal region)

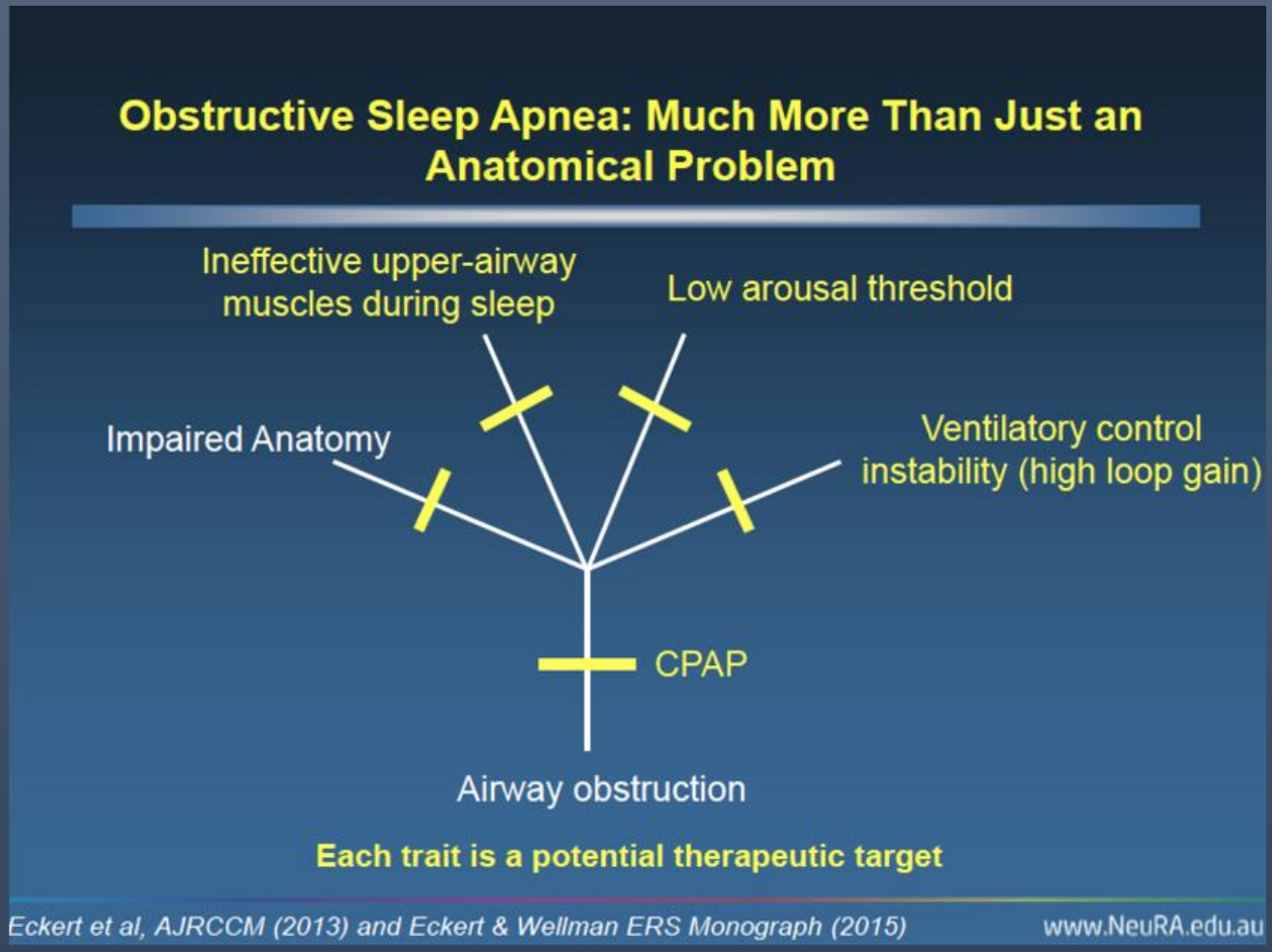
• Tongue size (scalloped tongue forms) and tongue fat are correlated with AHI.

2-10% Weight gain/loss significant effects on tongue fat

Lower and more posterior hyoid bone position significant predictor

(Kim et al, Sleep 37;1639-1648, 2014)

OSA : A MULTIFACTORIAL ETIOLOGY



Obstructive Sleep Apnea Comorbidities

- **Increased risk:**
- Hypertension and Cardiovascular Disease
- Cardiac Arrhythmias
- Immune System Compromise
- Irritability Mood Disorder, Depression
- Learning, Memory Problems
- **Association:**
- Metabolic Disorders (Type 2 Diabetes)
- Sleep Bruxism (Dental Damage, Jaw Dysfunction & Morning Headaches)
- Gastric Esophageal Disease (GERD)

McNicholas WM, Bonsignore MR, Lévy P, Ryan S : Lancet Respir Med 2016; 4: 826-34

OBSTRUCTIVE SLEEP APNOEA (OSA) : Review

- **Obstructive sleep apnea is highly prevalent** in the general population worldwide, especially in its mild form.
  - Clinical manifestations correlate poorly with disease severity measured by the apnea–hypopnea index (AHI), which complicates diagnosis.

- **Full Polysomonography (PSG)** might be more appropriate to assess suspected mild cases.
  - Limited ambulatory OCST diagnostic systems are least accurate in mild disease.

- **Superior efficacy of CPAP in reducing AHI.**
  - ***Offset*** *by greater tolerance of oral appliances, especially in mild disease.*

- **Severe OSA is associated with adverse health consequences**, including cardio/metabolic comorbidities.
  - The association with mild disease is unclear.

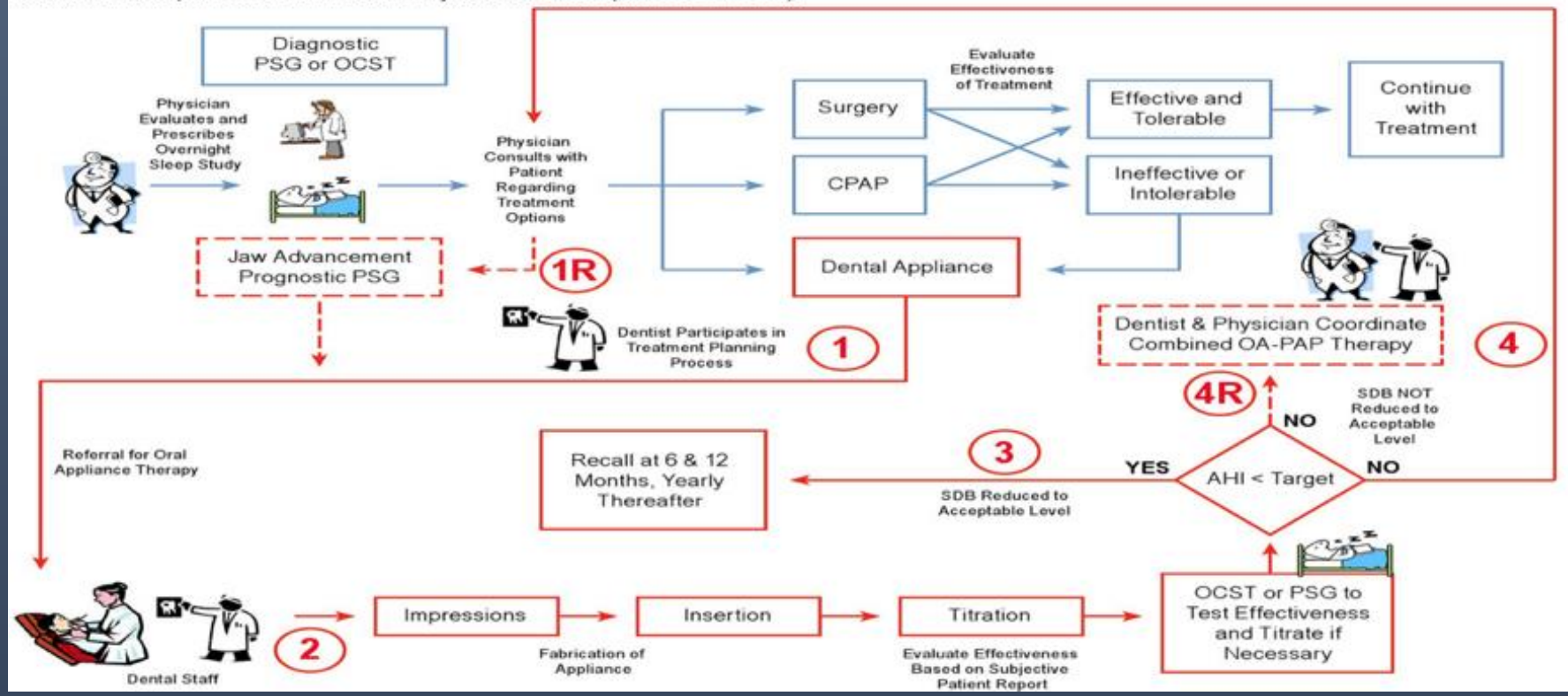
McNicholas WM, Bonsignore MR, Lévy P, Ryan S : Lancet Respir Med 2016; 4: 826-34

COLLABORATIVE MANAGEMENT MODEL

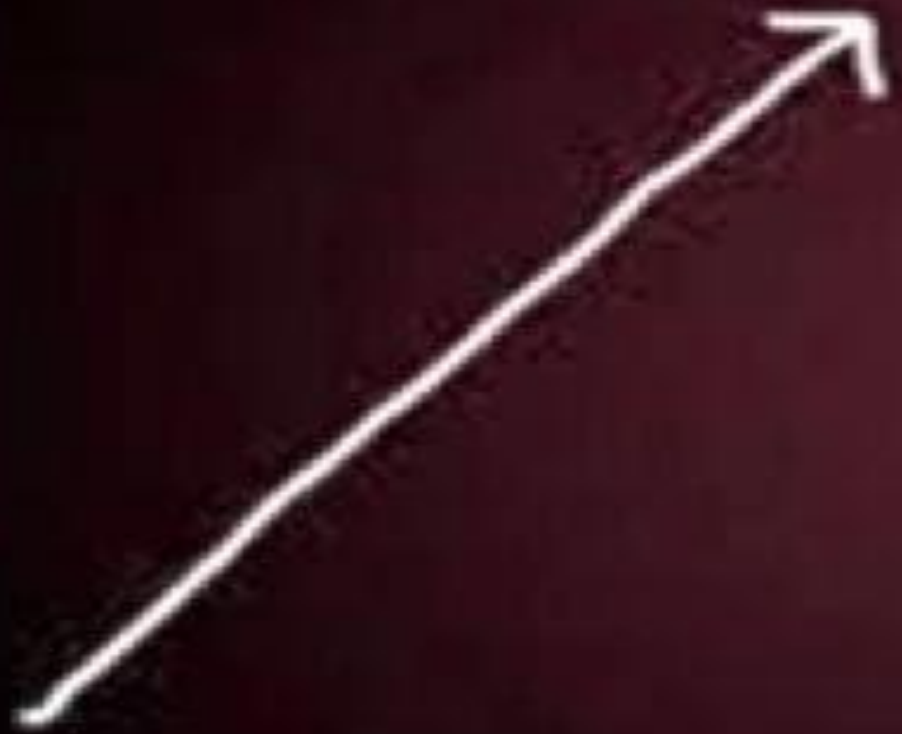
Journal of Clinical Sleep Medicine
Official Publication of the American Academy of Sleep Medicine

Schematic diagram of the proposed care-under-one-roof model for integrating dental sleep medicine and sleep medicine within the university-based sleep disorders center

Research components are indicated by dashed lines (see **1R** and **4R**).



SUCCESS



WHAT PEOPLE THINK IT LOOKS LIKE

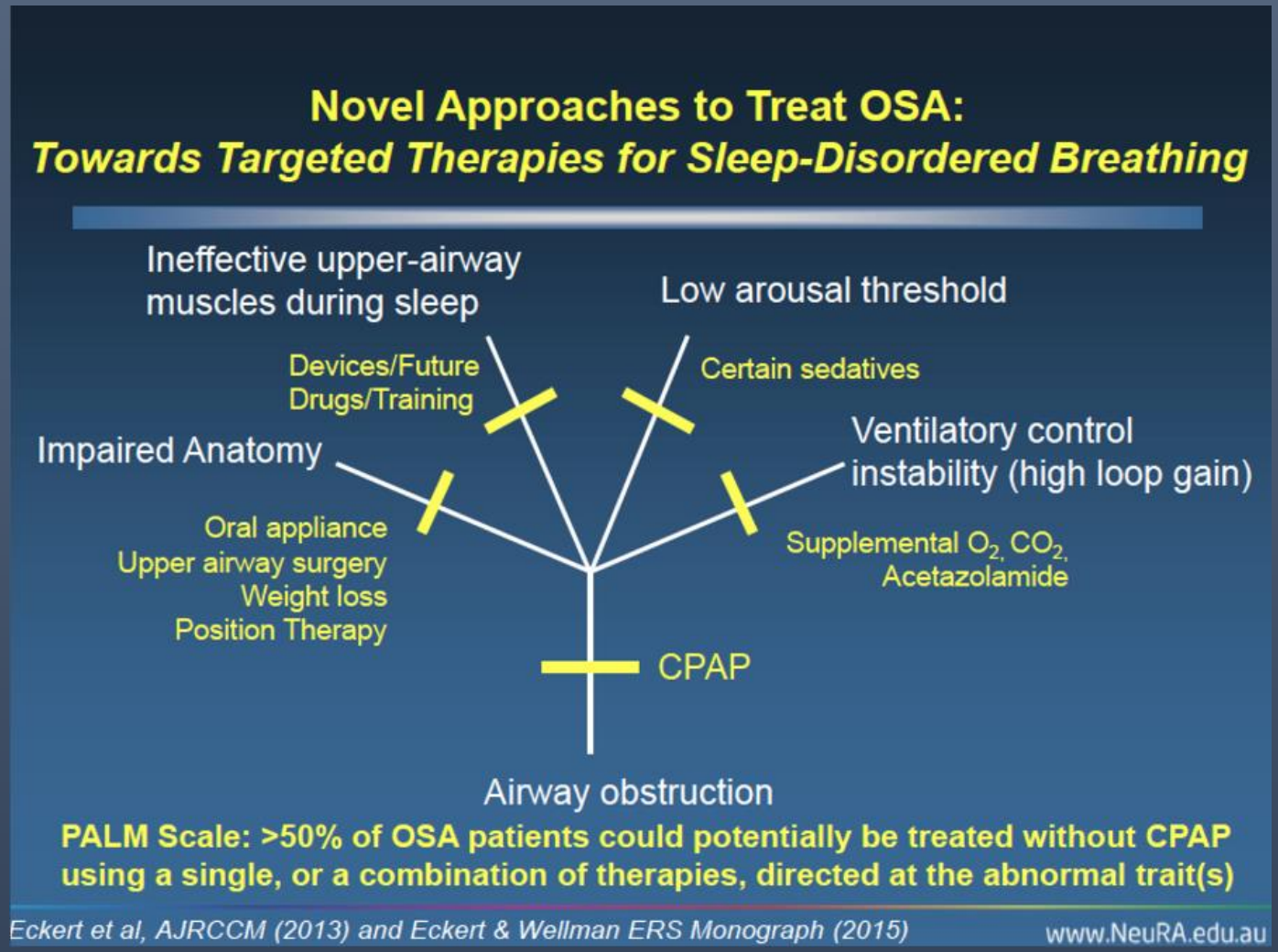
SUCCESS

WHAT IT REALLY LOOKS LIKE

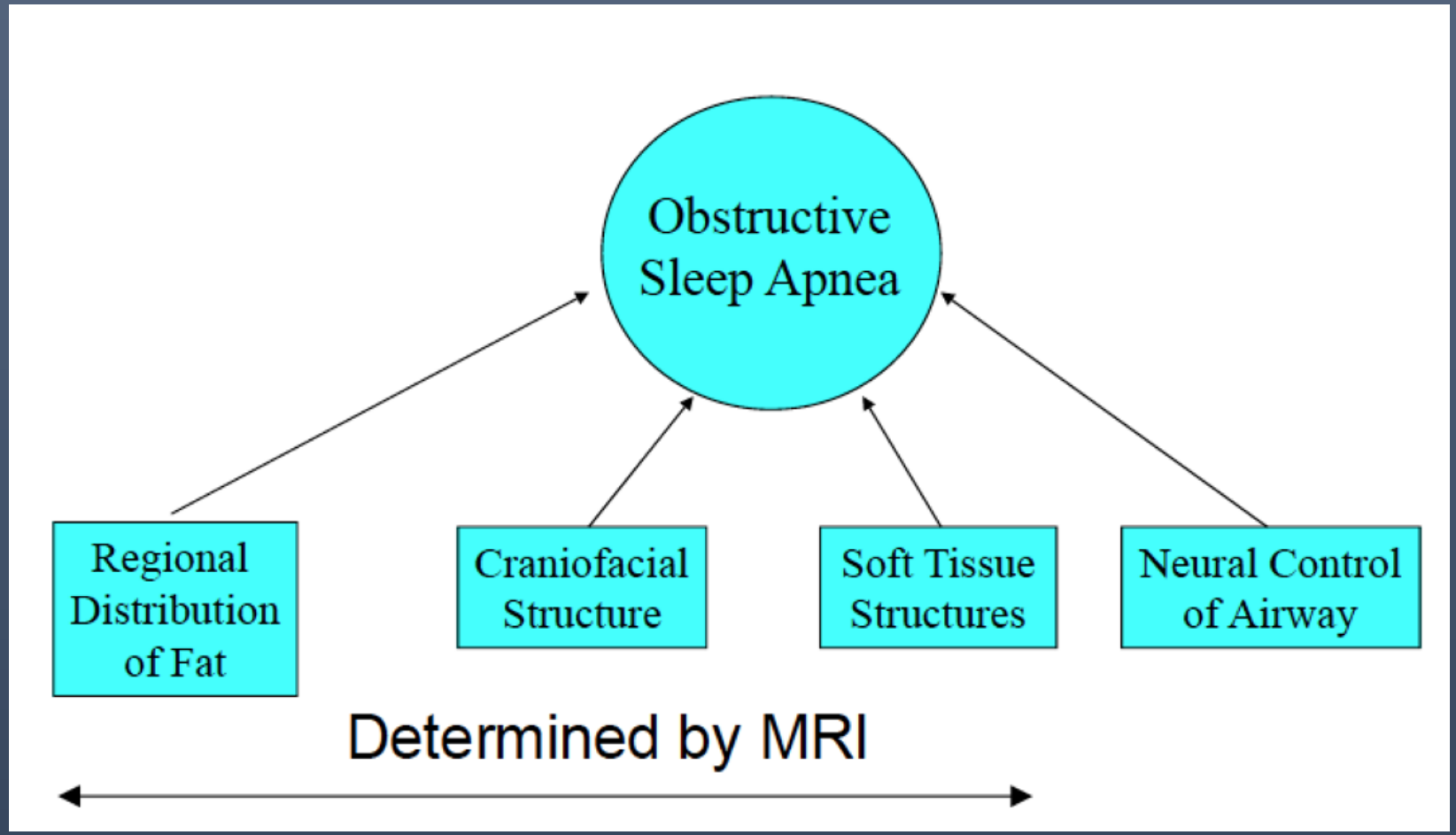
Nurse Practitioner Role in co-ordination of complex service delivery interactions

- Team lead by sleep physician
- Co-ordination with respiratory physician (to include pulmonologist)
- ENT/Otolaryngologist / Maxillofacial surgeon involvement
- Sleep laboratory respiratory technologist
- OCST (Home sleep test) provider
- Dental specialists
- Cognitive behavioural therapy provider service
- Nutritionist, weight management support

Targeting Collaborative Therapies



Phenotype Perspectives in OSA Treatment Approaches



After Schwab 2016

Comprehensive OSA Management Approach

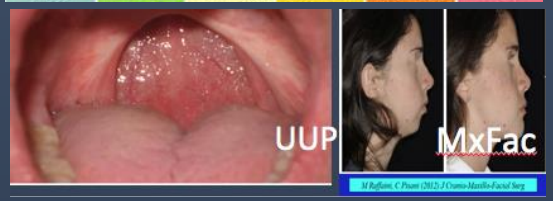
CPAP
Continuous positive airways pressure

Oral Appliances
Several types, dependent on clinical Presentation, patient anatomy and proposed device tolerance

Positional aids
Encourage patient to avoid supine position and encourage left or right lateral sleeping position

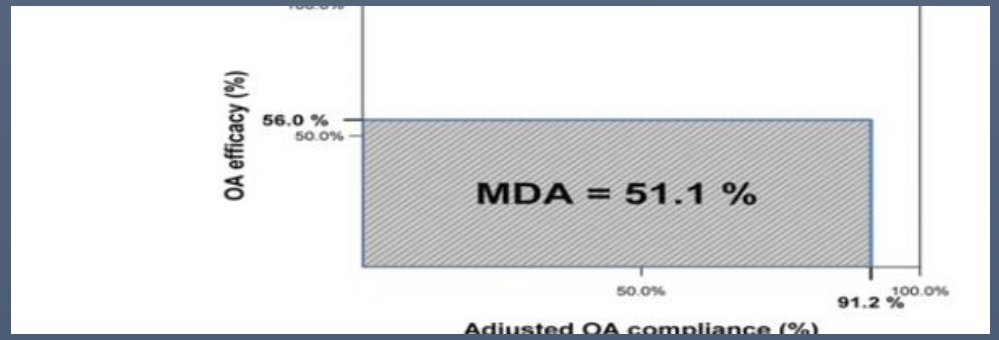
Weight : BMI Management
Multifactorial engagement with prevailing circumstances/presentation

Surgical Options (Less common)
Uvulopalatopharyngoplasty (UPPP)
Radiofrequency volumetric tissue reduction (RFVTR)
Septoplasty and Turbinate Reduction
Glosseal resection
Orthognathic Surgery: Jaw resection
Weight loss surgical interventions: Bariatric surgery



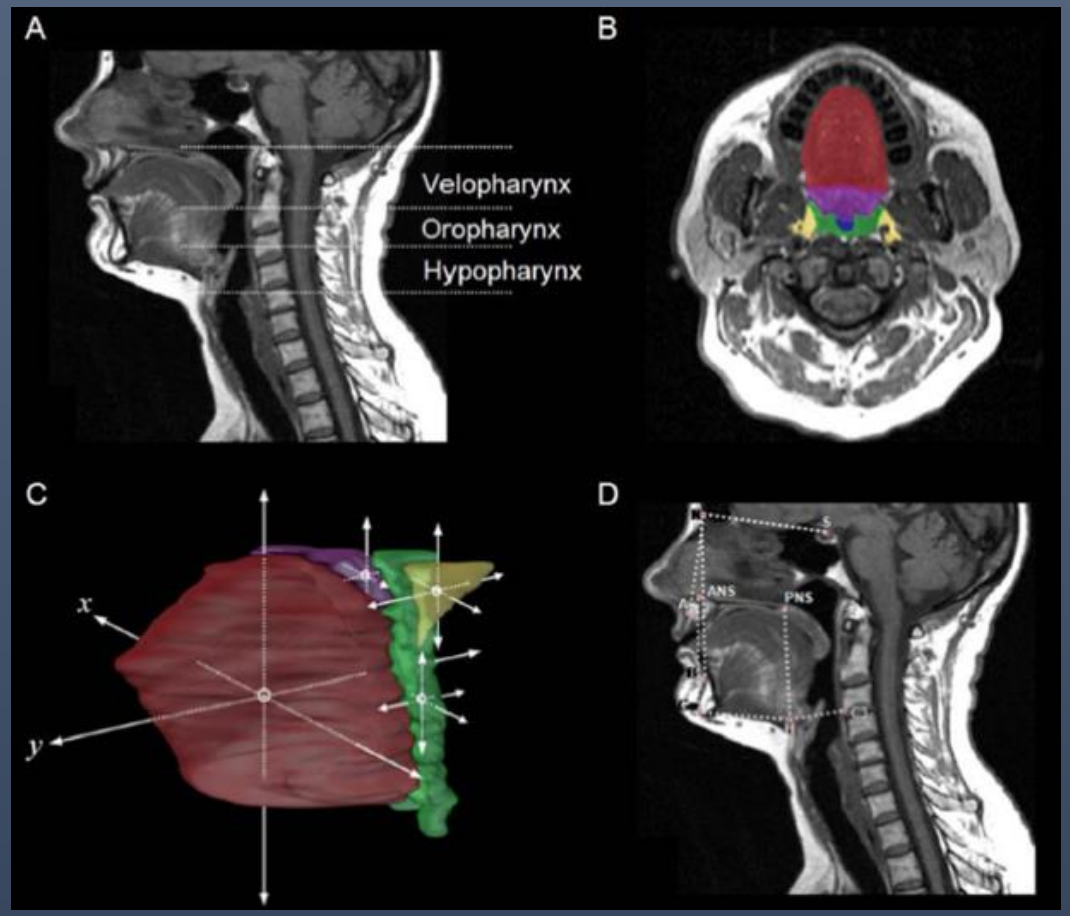
Obstructive Sleep Apnea: Management options

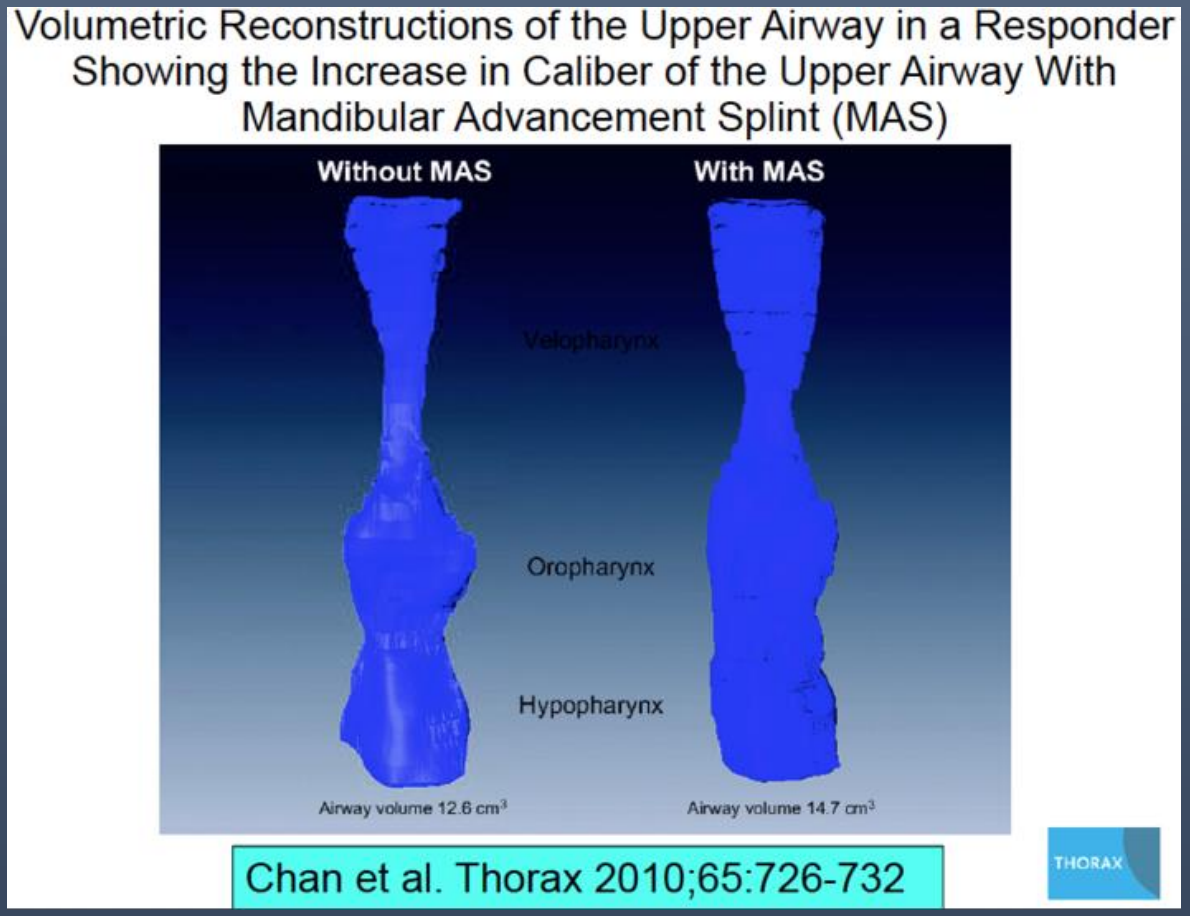
- **CPAP**
  - 100% Efficacy 50% Tolerance
- **Oral Appliance Therapy (OAT)**
  - Not as Effective, Not as Obtrusive
  - Portable/ Quiet
- **Surgery**
  - Most invasive



Vanderveken O, et al Objective measurement of compliance during oral appliance therapy for sleep-disordered breathing 2012 Thorax : 0: 1-6

Oral Appliance effectiveness at velopharyngeal level





Therapeutic Orthotic Functional Matrix

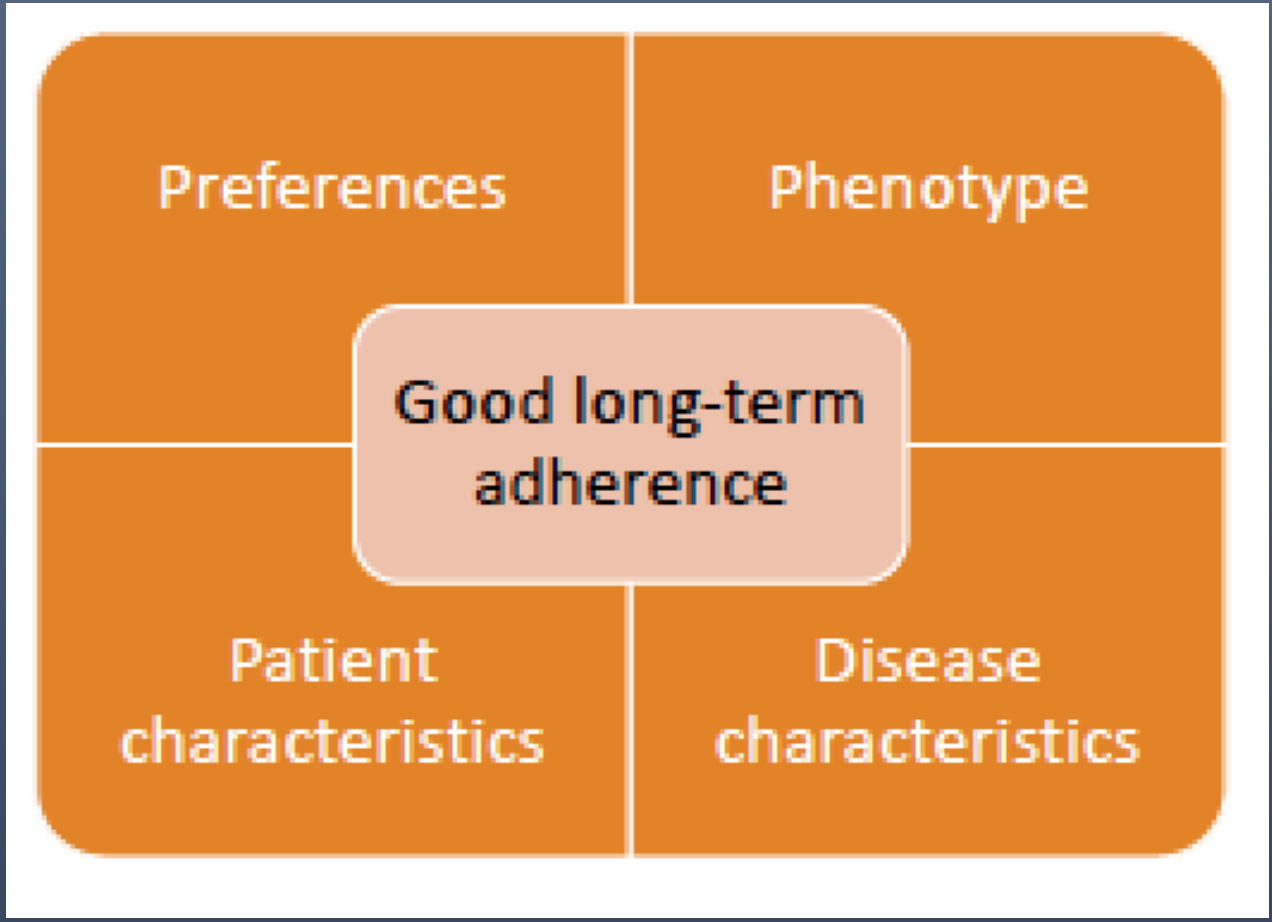
How effective is therapy?

- Individual Variation & Tolerance
  - Snoring, OSA, Sleep Bruxism
- Evidence Based Effectiveness?
  - Comparative Crossover Studies
  - Cardiovascular / BP
  - Day-time sleepiness
  - QOL
- Adherence
  - Efficacy vs Effectiveness CPAP Vs OAT
  - Mean Disease alleviation (MDA)compared to alternative to alternative approaches

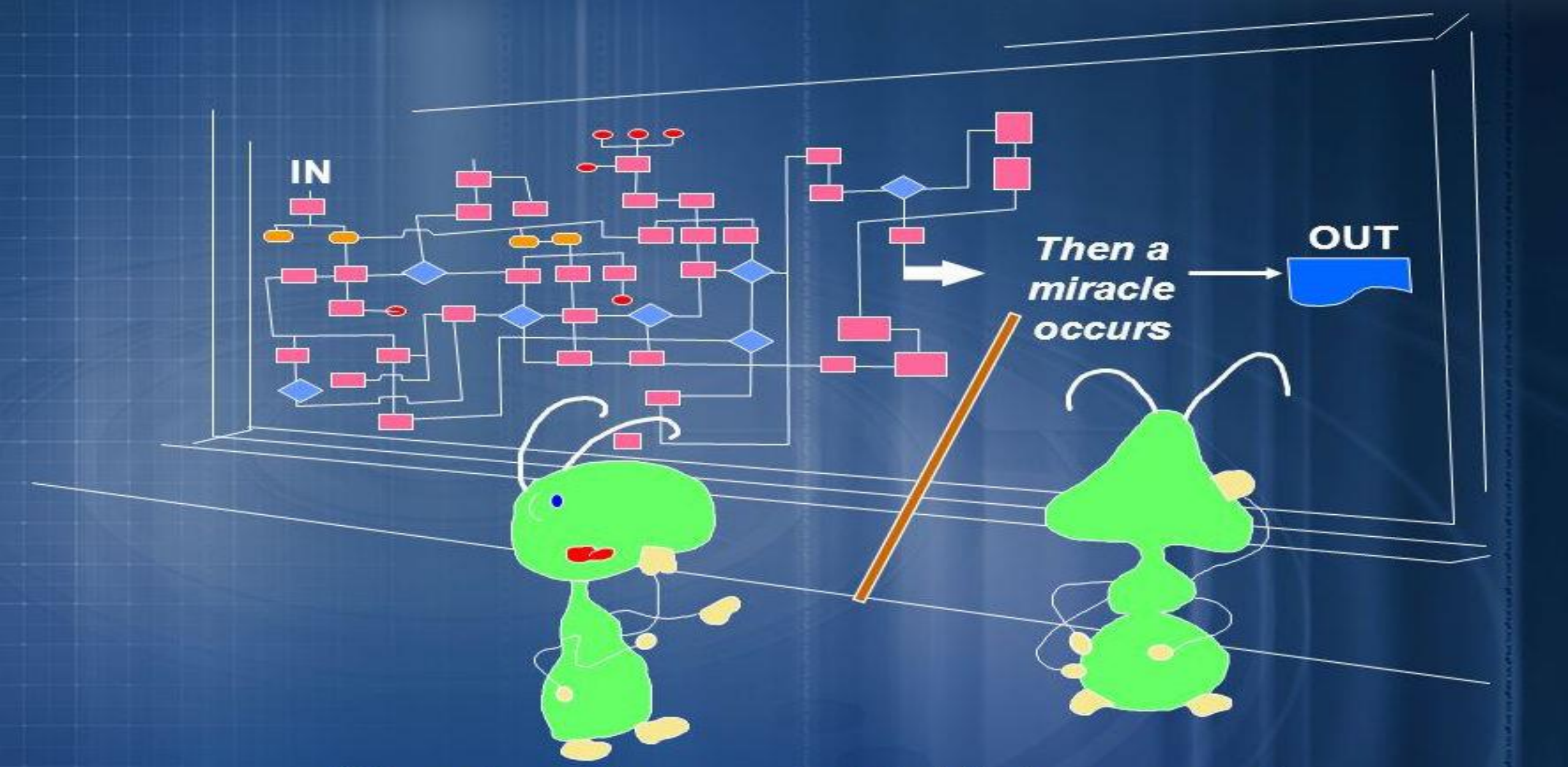
TAP appliances

Phillips C.L., et al. Health outcomes of continuous positive airway pressure versus oral appliance treatment for obstructive sleep apnea: a randomized controlled trial. American Journal of Respiratory and Critical Care Medicine, 2013. 187(8): p. 879-87.

MANAGEMENT CONSIDERATIONS IN OSA



Sutherland K, Vanderveken OM, Tsuda H et al Oral appliance treatment for obstructive sleep apnea : an update J Clin Sleep Med 2014; 10: 215-27



"Good work ..... but I think we need just a little more detail right here"

Thank you!

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