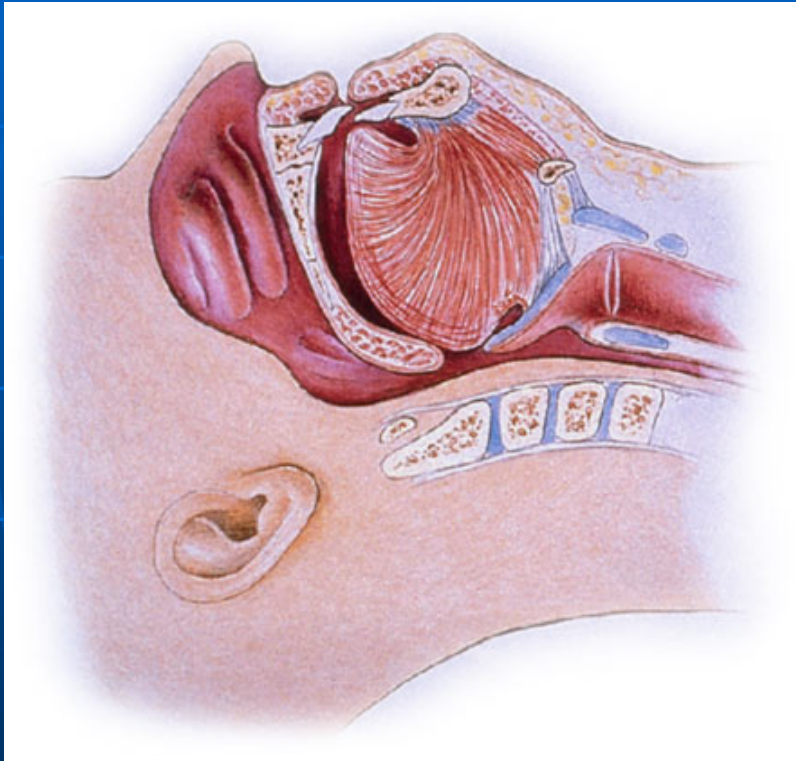


OBSTRUCTIVE SLEEP APNEA SYNDROME AND THE TRANSPORTATION INDUSTRY

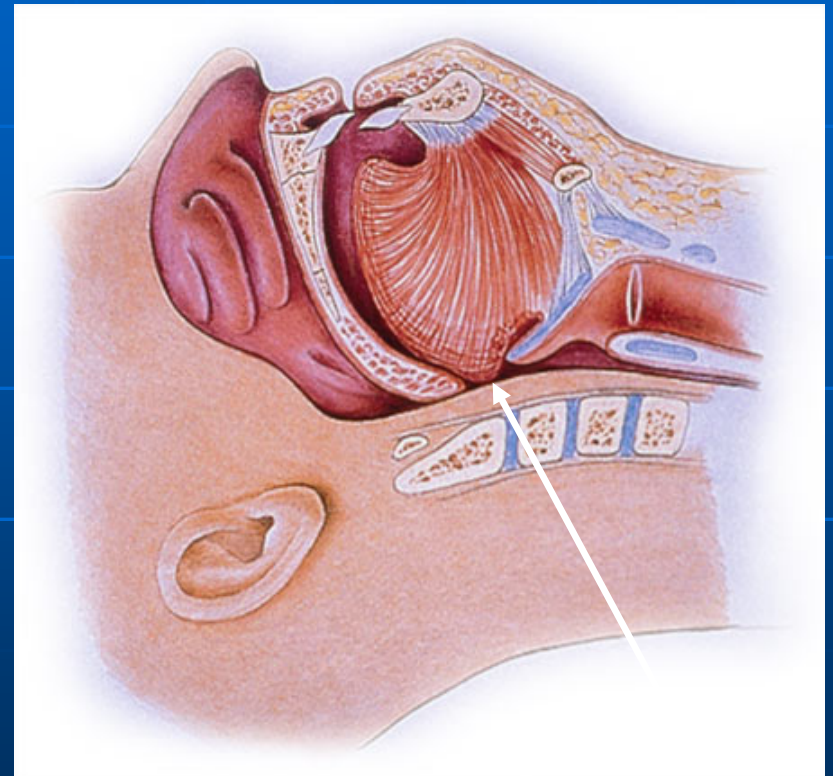
Aris Iatridis, MD, FAASM
Medical Director, Georgia Lung
Associates Sleep Disorders
Laboratory

Sleep apnea is caused by
repetitive obstructions of
the upper airway during
sleep

Pathophysiology of Apnea



Wakefulness



Sleep

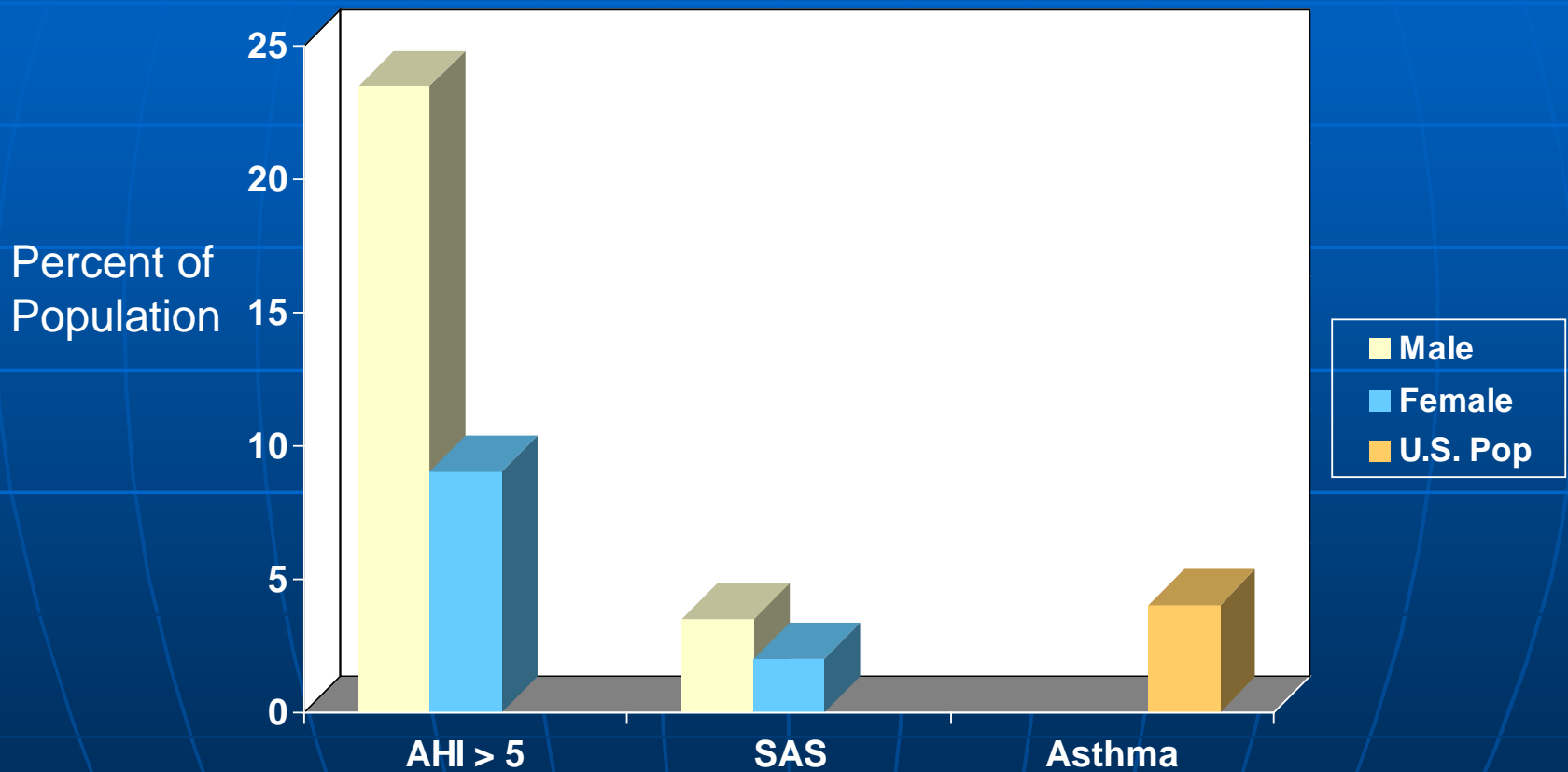
Measuring Sleep Apnea

- Less than 5 arousals per hour is normal
- 5 to 14 arousals per hour is mild sleep apnea
- 15 to 29 arousals per hour is moderate sleep apnea
- Over 30 arousals per hour is severe sleep apnea

The number of arousals per hour is termed the Apnea Hypopnea Index

Prevalence of Sleep Apnea

30-60 year olds



Adapted from Young T et al. N Engl J Med 1993;328.

Reasons Why We Care About Sleep Apnea

- Sleep apnea can alter a person's quality of life & performance at work.
- Sleep apnea increases the risk of strokes, heart attacks, high blood pressure, and abnormal rhythms of the heart. Also, it can lead to worsening blood sugars in diabetics.
- Patients with uncontrolled sleep apnea have a higher mortality from cancer, due to the fact that low oxygen levels in tissues enhance the spread of cancer cells.

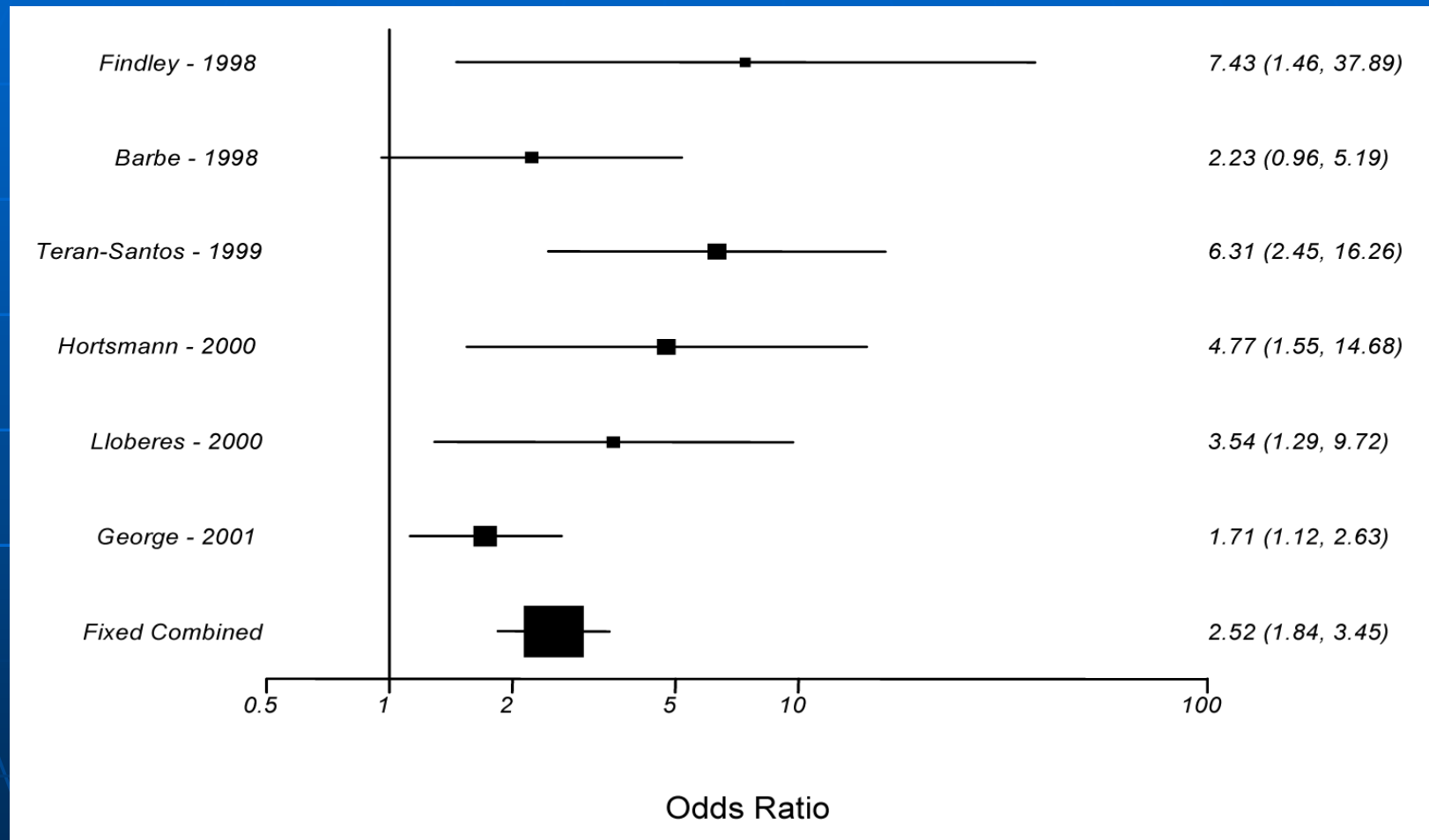
Symptoms of Sleep Apnea Syndrome

- Excessive daytime sleepiness
- Non-restorative sleep
- Worsening short-term memory
- Inability to concentrate
- Irritability
- Depression

Psychomotor Vigilance Testing (PVT) of Truck Drivers

- Having severe Sleep Apnea (AHI greater than 30 arousals per hour) results in PVT scores equivalent to a normal person who got less than 5 hours sleep the night before.

Consequences: Automobile Accidents



Sassani et al, Sleep 2004; 27:453

Commercial Drivers Commonly Have Obstructive Sleep Apnea

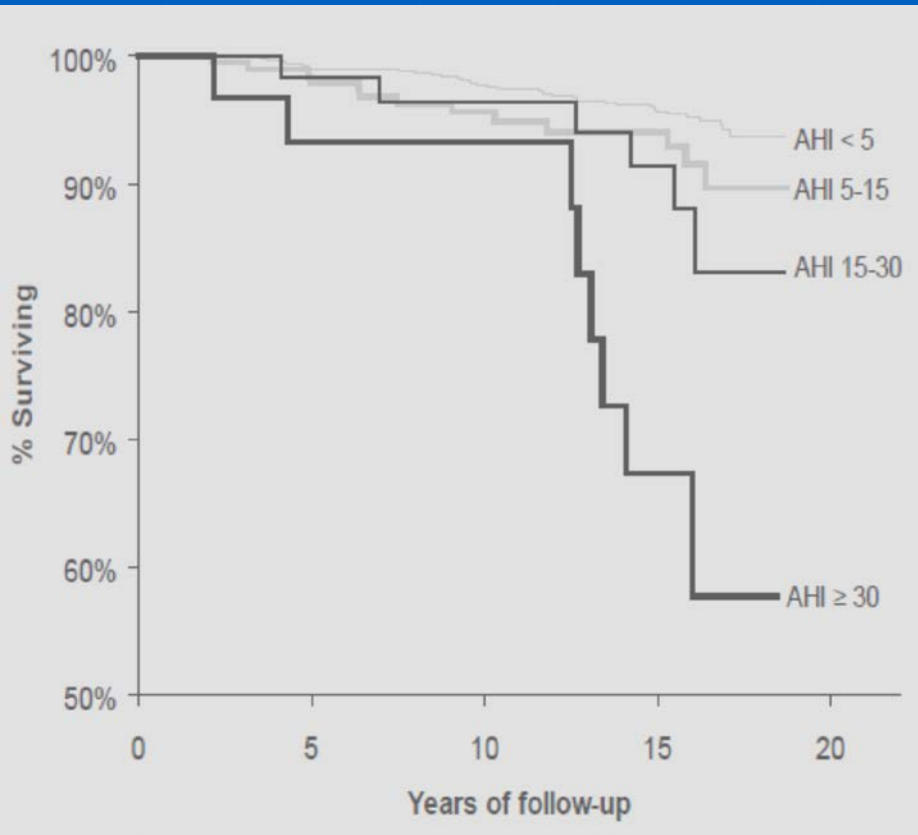
	Howard et al (AJRCCM 170:1014, 2004)	Gurubhagavatula et al (AJRCCM 170:371, 2004)
Normal (AHI <5)	40.4%	71.9%
At least mild (AHI >5)	59.6%	28.1%
Moderate (AHI >15)	24.9%	10.5%
Severe (AHI >30)	10.6%	4.7%

Does This Also Apply to Pilots?

- The rate of obesity (BMI > 30 kg/m²) of pilots is much lower than that of truckers:
 - First Class Pilots 15%, 2nd class 22%, 3rd class 24% (Aviat Space Environ Med, 2007)
 - Truckers 33-50% (mult. Studies)

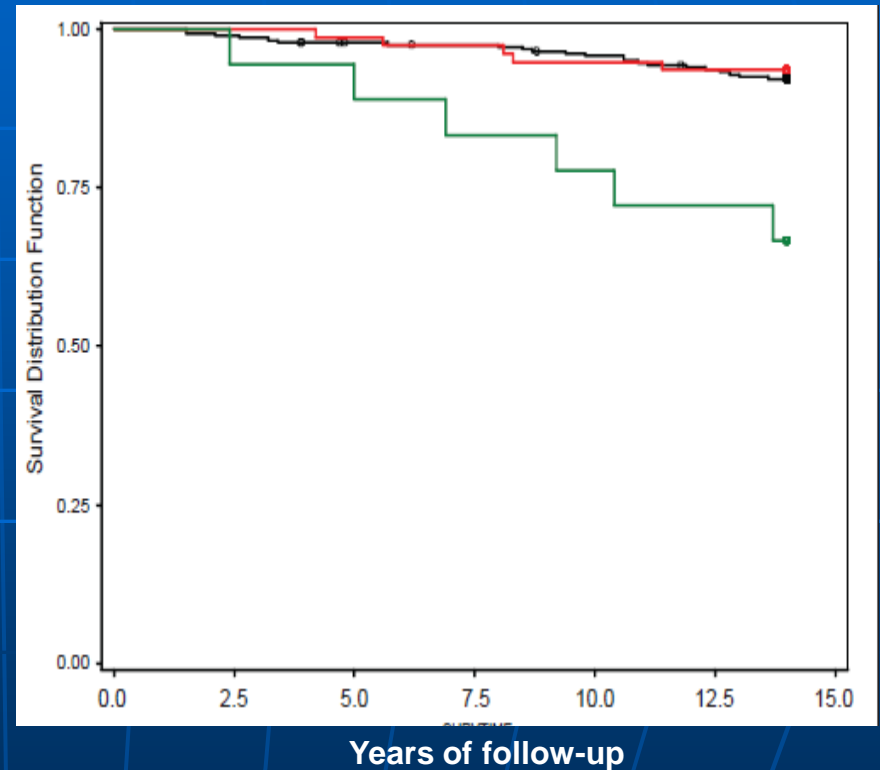
Consequences: Mortality

Wisconsin Cohort



Young et al. Sleep 2008; 31:1071-1078

Busselton, Australia

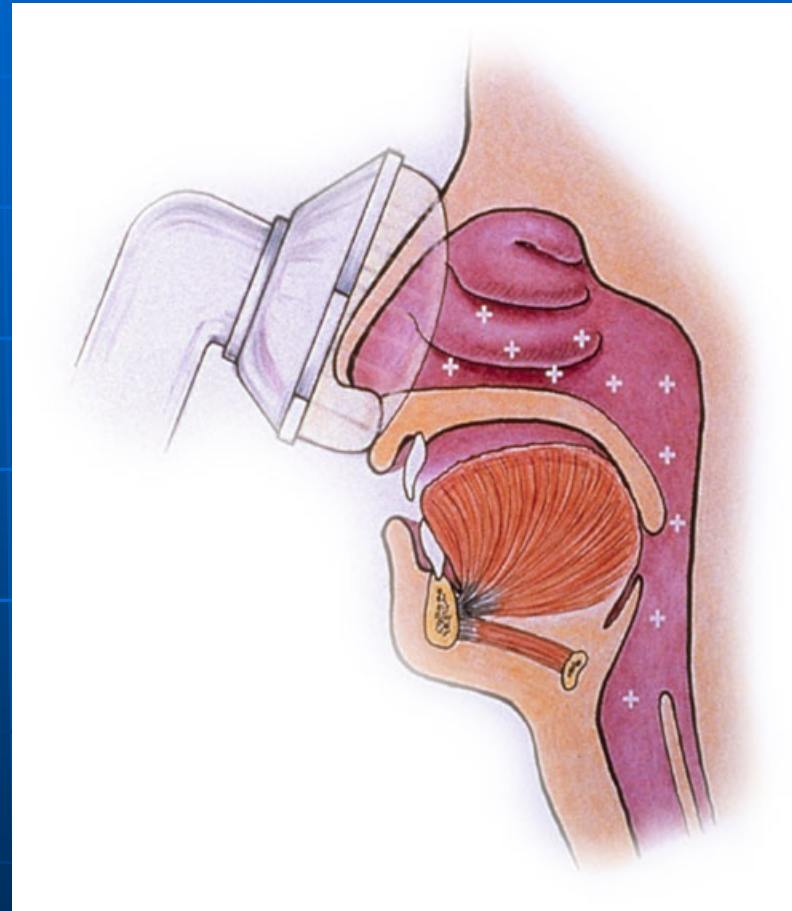
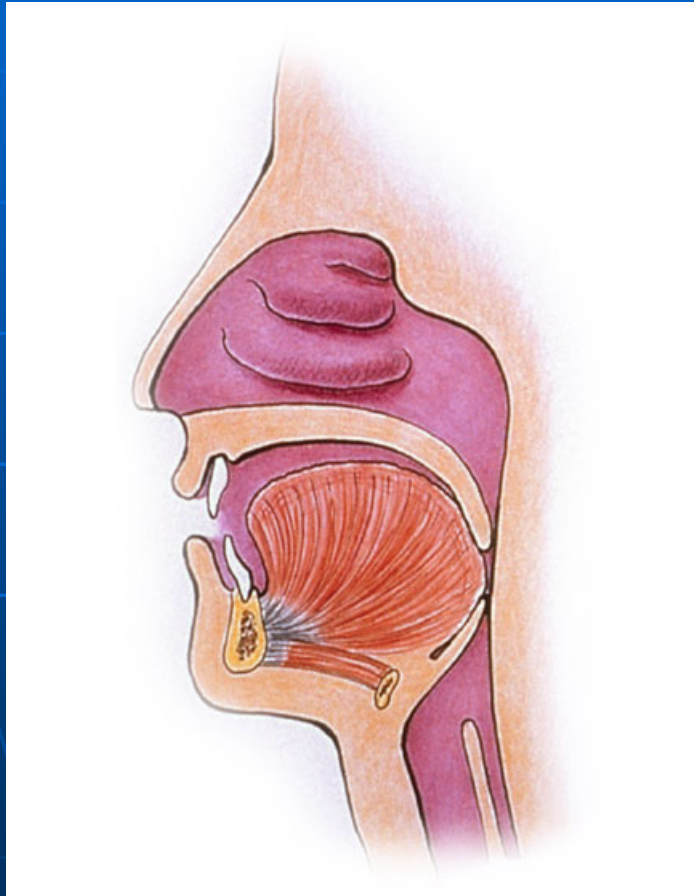


Marshall et al. Sleep 2008; 31:1079-1085

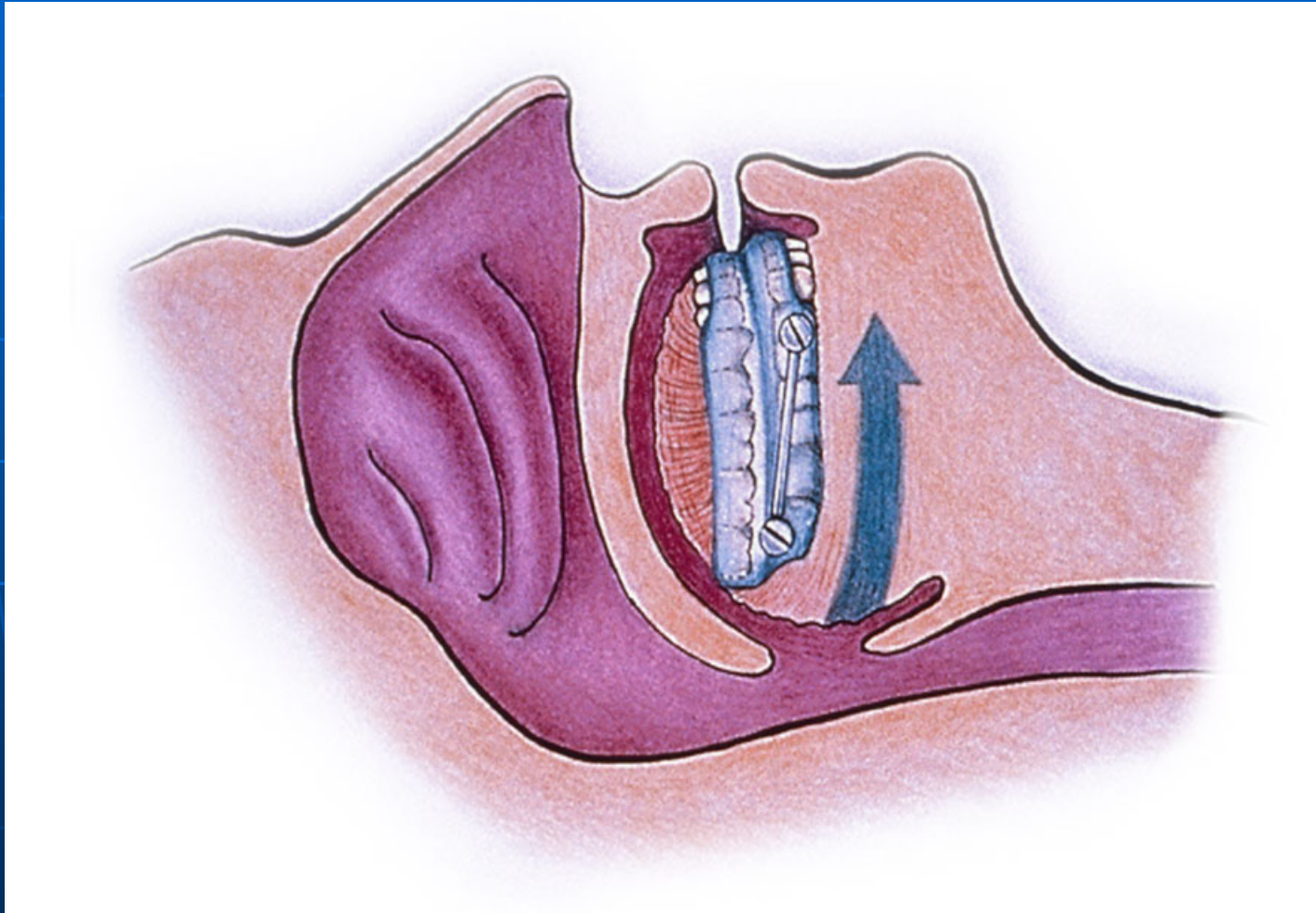
How Do You Treat Sleep Apnea?

- CPAP (Continuous Positive Airway Pressure)
- Weight Loss
- Oral Appliances
- Surgery

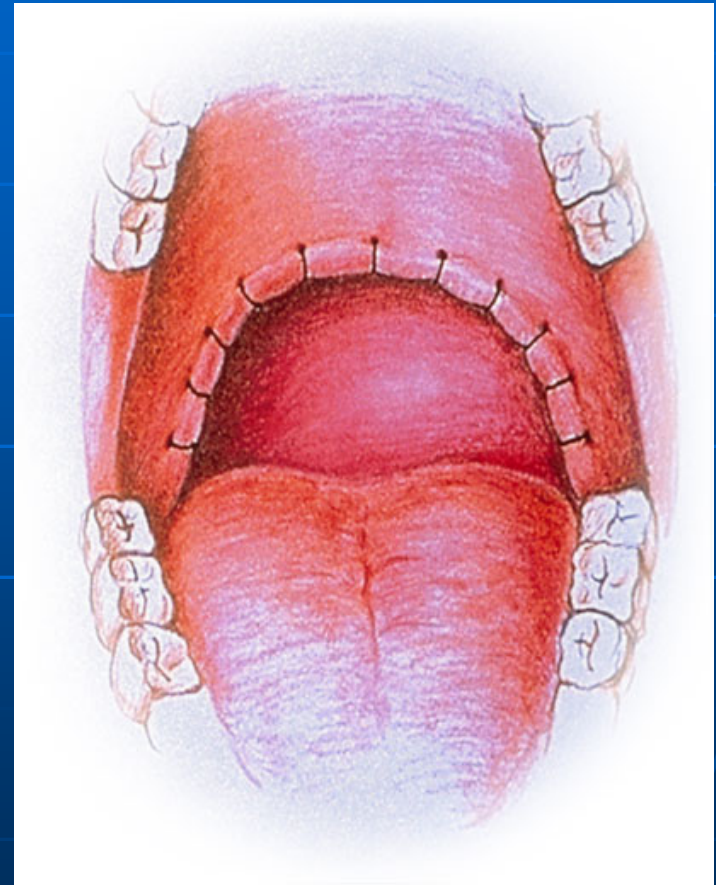
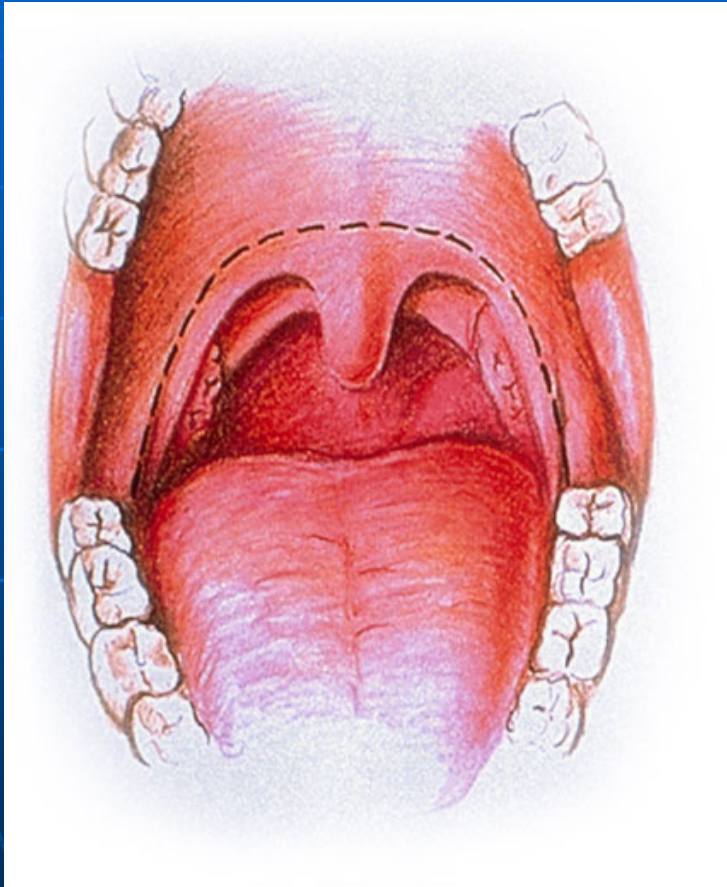
Positive Airway Pressure



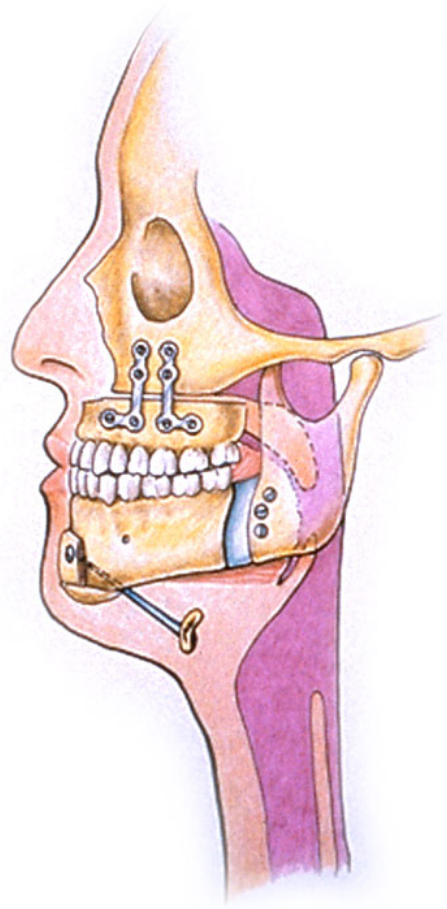
Oral Appliance: Mechanics



Uvulopalatopharyngoplasty (UPPP)

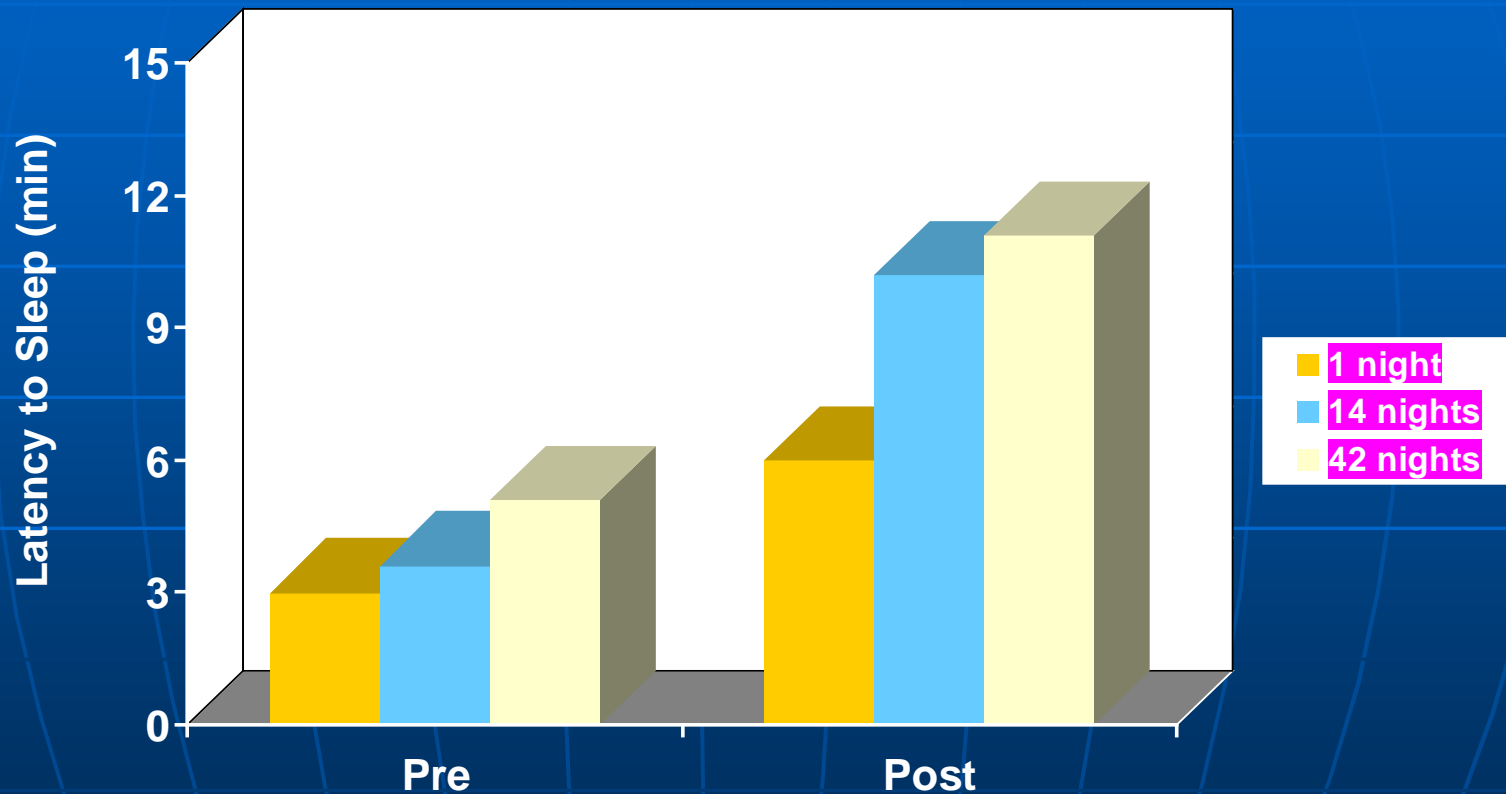


Phase II Surgery



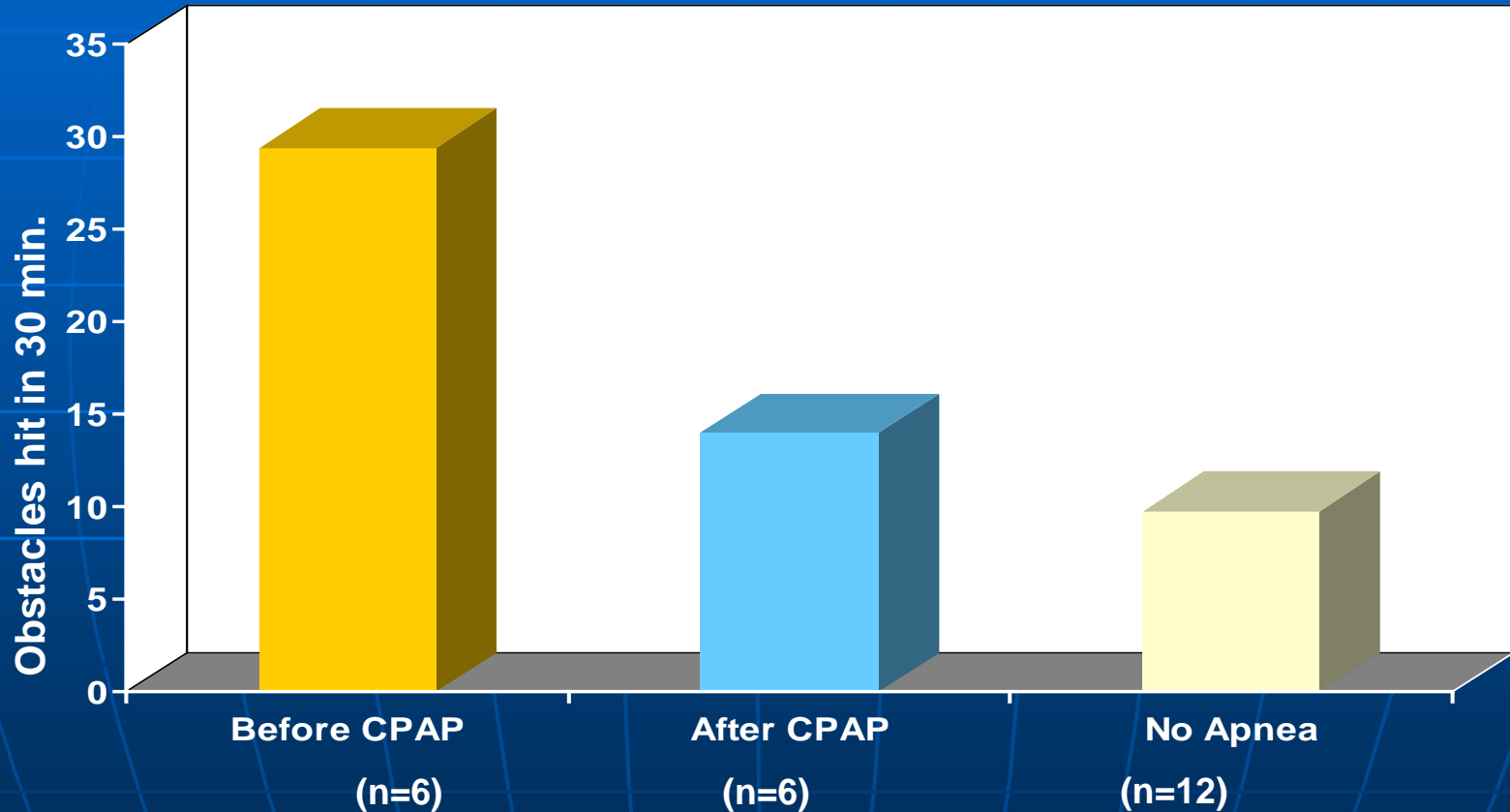
Benefits of CPAP: Sleepiness

CPAP Treatment



Adapted from Lamphere J
et al. Chest 1989;96.

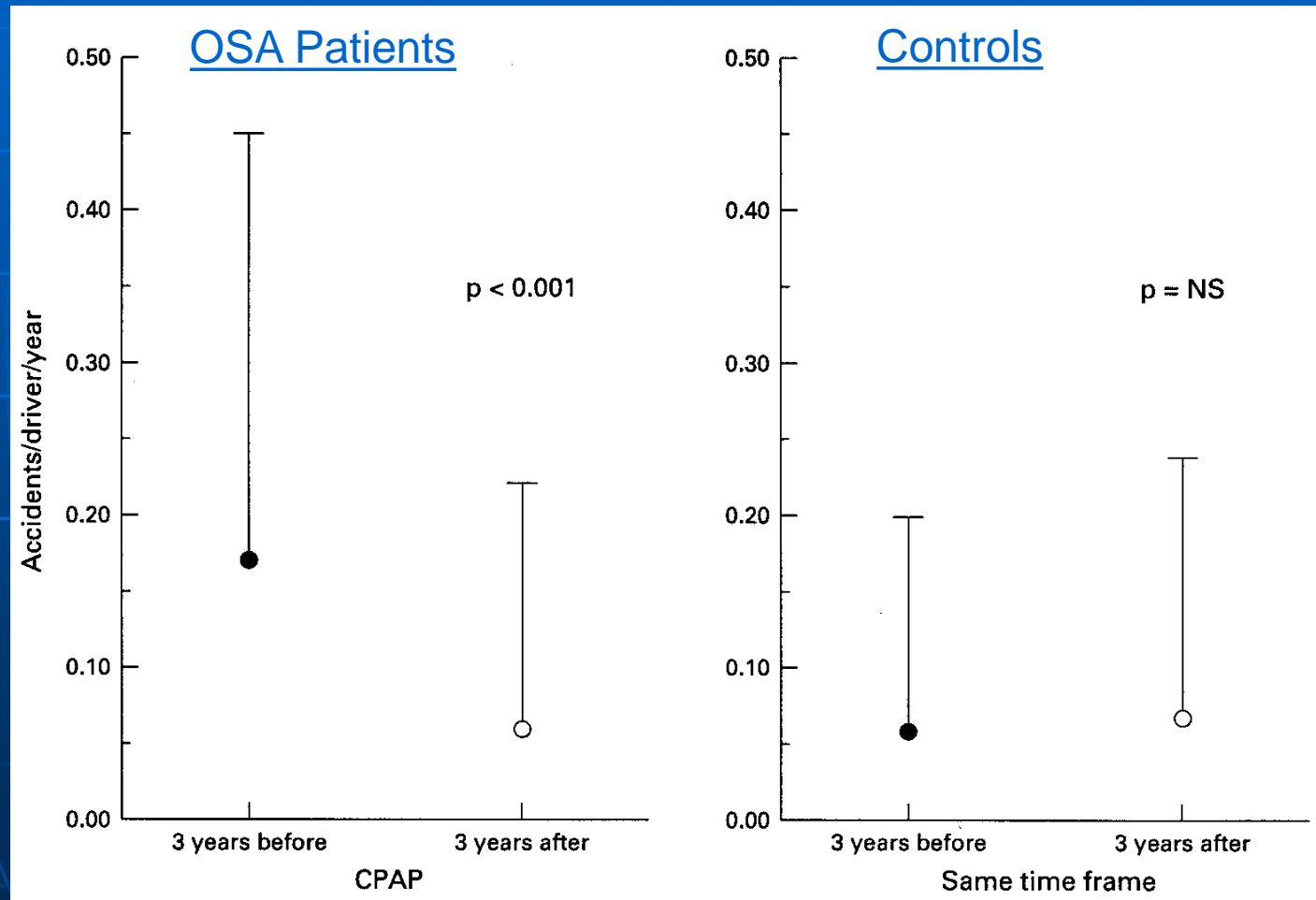
Benefits of CPAP: Performance



Adapted from Findley L et al. Clin Chest Med 1992;13.

Crash Rates Before and After CPAP in Passenger Car Drivers Compliant with CPAP and In Controls

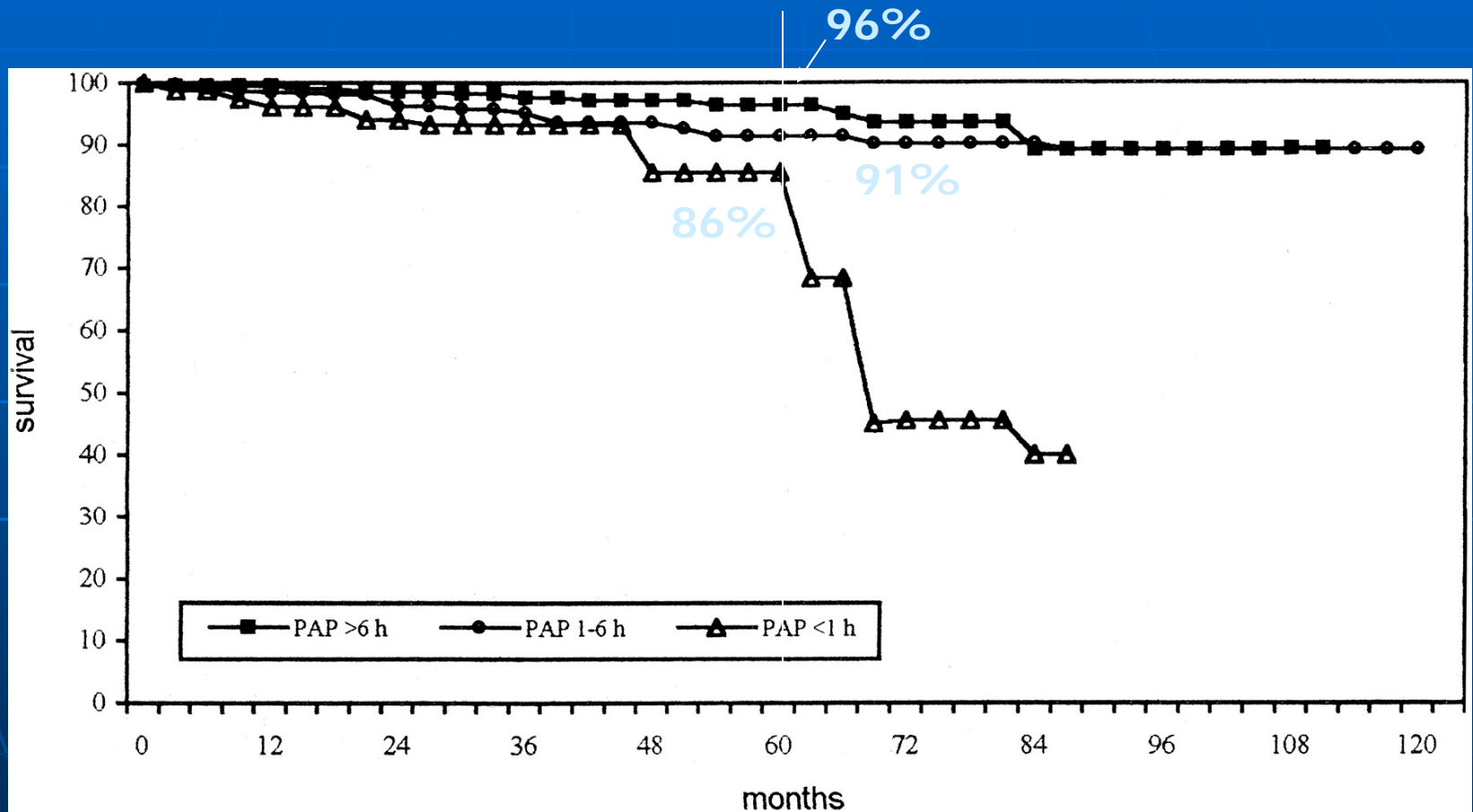
(George, Thorax 56:508, 2001)



Crash Rates Before and After CPAP

- Meta-analysis of multiple studies between 1996-2006 indicates crash rate is decreased by 72% following placement on CPAP (Tregear et al., Sleep 2010)

Benefits of CPAP: Mortality



Who Should Be Treated?

- Anyone with moderate to severe sleep apnea (AHI \geq 15)
 - Treatment in this group improves both quality of life and cardiovascular outcomes
- Patients with mild sleep apnea (AHI 5-15) require treatment only if
 - Significant daytime symptoms
 - Medical comorbidities: known CAD, CHF, HTN (either new or requiring more than 1 med for control), cardiac arrhythmias or hx CVA

Schneider Trucking Sleep Apnea Program

- Tracked 339 drivers with Sleep Apnea
- Evaluated safety and health care costs 12 months before and after treatment
- Statistically analyzed by Definity Health (unpublished, presented at Ga Motor Trucking Assoc, June 2011)

Schneider Findings

- Preventable crashes reduced by 30%
- Median cost of crashes reduced by 48%
- Retention rate improved by 60% over fleet average
- Health care costs reduced by over 50%
- Health care savings per driver of \$539/month
- Expanded study to 788 drivers in 2006 with similar results

Waste Management Inc Sleep Apnea Cost Data

- 156 drivers treated for sleep apnea with CPAP
- Average health-related cost savings per driver between year before treatment and 2 years after treatment was \$3086 (from \$7906 to \$4660, savings of 41%)

Hoffman, J Occup Environ Med 52:473, 2010

Waste Management Inc Data

- If the cost of the sleep study and CPAP machine (\$2244) was excluded from health costs in the year before treatment, then annual health-related savings is "only" 17.7%

Cost Effectiveness

- Mathematical modeling indicates that CPAP therapy for moderate to severe sleep apnea in a 50 year old man is more cost-effective than screening for diabetes or doing an annual mammogram

SCREENING RECOMMENDATIONS FOR COMMERCIAL DRIVERS

Joint Task Force of the ACCP,
ACOEM, and National Sleep
Foundation (2006, updated 2012)

JTF Recommendations – Medically Cleared to Drive If:

- No positive findings on evaluation (BMI < 35)
- Diagnosis of OSA with documented CPAP compliance, or with cure documented by sleep study following surgery

Immediate Disqualification and Out-of-Service Evaluation if:

- Observed/confessed and unexplained excessive sleepiness
- MVA likely related to excessive sleepiness
- Previously diagnosed sleep disorder
 - Noncompliant with therapy
 - No recent follow-up
 - Surgical intervention with no follow-up sleep study

Conditional Certification for Two Months

- BMI > 35 kg/m², pending sleep study
- Have been diagnosed with sleep apnea, with AHI > 20, pending documented compliance with CPAP
- Have undergone surgery and are pending post-op sleep study.

Joint Task Force

Recommendations, cont.

- Once initial compliance with CPAP is documented, then conditional certification given for another 3 months.
- If compliance acceptable then patient certified for one year.
- Acceptable compliance considered to be CPAP use 5 out of 7 nights, at least 4 hrs per night

How Well do these Criteria Work?

(Xie et al, JOEM 2011;53(2):473)

- Out of 1833 drivers with no previous hx OSA, 192 screened positive
- 65 underwent PSG, 127 lost to follow-up
- 51 out of 65 had OSA (78.5%)

Talmadge et al, JOEM 2008;50:324

- 1443 drivers screened
- Out of 190 screening positive, 56 refused PSG
- Out of 134 tested, 127 were positive for OSA, including 87 (65%) moderate to severe

What does this screening program for truckers accomplish?

- It probably identifies only a minority of truck drivers who have moderate to severe sleep apnea and are (probably) impaired as a result
- **CONCLUSION:** This is better than nothing but far from optimal

A Truly Effective Screening Program for Sleep Apnea

- Must rely not only on physical criteria but on the subject (pilot) giving a truthful account of symptoms.
- Therefore, this must be NON-PUNITIVE IN TERMS OF COST AND JOB SECURITY.