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SLEEP 101

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Objectives

Describe the societal influences on obtaining optimal sleep

Identify the 5 stages of sleep

Articulate the impact of sleep on health and functioning

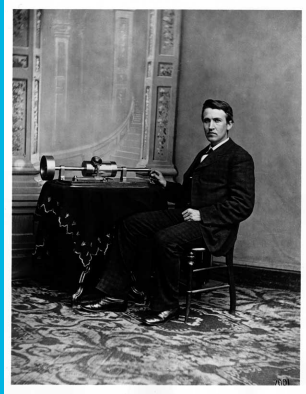
Discuss sleep hygiene and other approaches to improving sleep

Societal Sleep Deprivation – Chronic & Pervasive

- Joanne Gonzalez, a suburban Dallas stay-at-home mother and Martha Stewart-- like domestic perfectionist
- She starts her days at 5:30 a.m. and ends them ... well, when the stimulants wear off.
- Immediately after waking, she starts the first of several loads of laundry, sees her husband off to work, fixes breakfast for her kids and then herds them into her Volvo station wagon for a long day of lessons, camps
- At night, she makes dinner for the family but not for herself. She says she's just too harried.
- Not until 10 p.m. or so, when the children are in bed and the house is finally quiet, does the speedy Gonzalez relax--if you define relaxing as mopping the floors, doing yet more laundry and reading e-mail until 2 a.m.

Kirn, Time, 2004

Societal Sleep Deprivation - Chronic and Pervasive

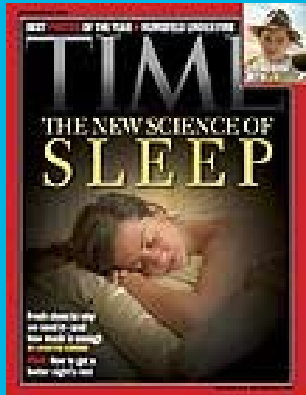


Personally, I enjoy working about 18 hours a day. Besides the short catnaps I take each day, I average about four to five hours of sleep per night.

Time is really the only capital that any human being has and the thing that he can least afford to waste or lose...

Thomas Edison

- As a society, we now get 20% less sleep than our ancestors only 100 years ago.
- College students oversleep their alarms 50% of the time



Life is Too Short - Challenges to Adequate Sleep



Life is Too Short - Challenges to Adequate Sleep

- Coffee is drug of choice for 60% Americans
- There are 167 million coffee drinkers in the U.S.
- They consumed nearly 6.3 billion gal. last year alone.
- The average drinker admits:
 - 3.4 cups coffee a day
 - 2.4 billion gal. of tea in 2003
 - 70% carbonated drinks caffeinated.
 - Americans consumed a stunning 15.3 billion gal. in 2003, or 574 cans for every man, woman and child.



20 oz

Kluger, Time, 2004

What is sleep and why is it important?

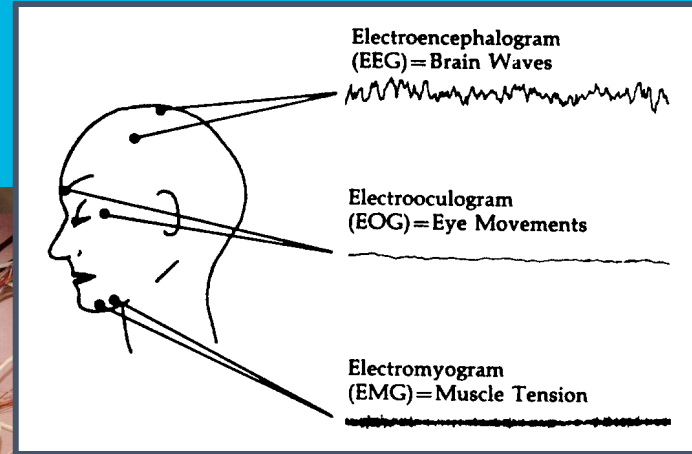


What is sleep?

- A reversible behavioral state of perceptual disengagement from and unresponsiveness to the environment.
- A very complex amalgam of physiological and behavioral processes.
- Unlike coma: physiologic, recurrent, and reversible.



Polysomnography



How do we define sleep?

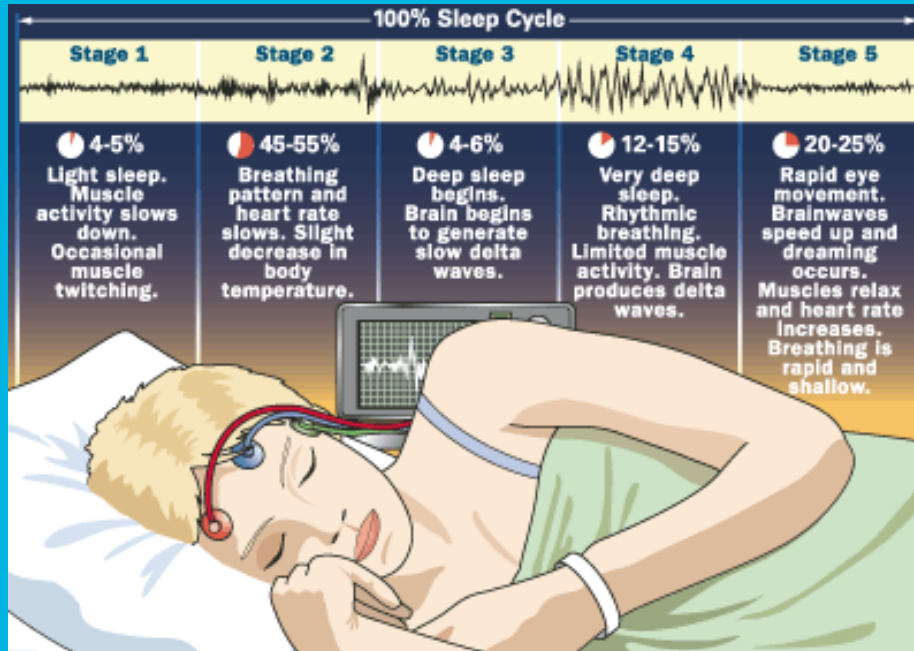
- ▶ Non-Rapid Eye Movement Sleep (NREM)

- ▶ Rapid Eye Movement (NREM)

- ▶ Differentiated by sleep study parameters
 - Electroencephalogram
 - Electrooculogram
 - Electromyogram

Primer on Sleep Architecture

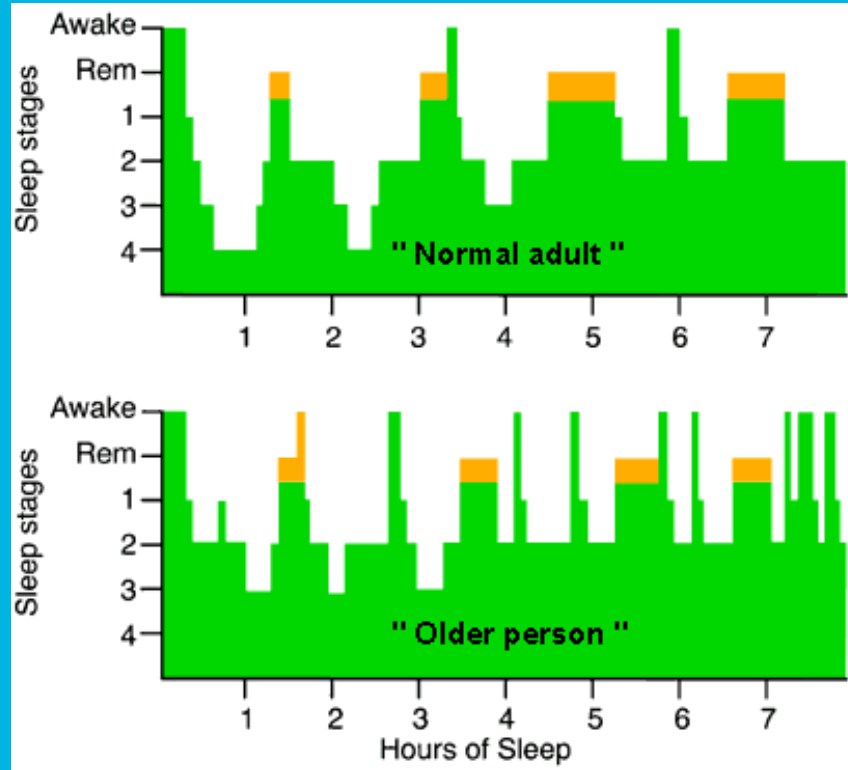
4-6 times/night at 60-90 minute intervals



Physiologic Changes During Sleep

<u>Physiologic Change</u>	<u>Stages 1 & 2</u>	<u>Stages 3 & 4</u>	<u>REM</u>
Heart Rate	↓	↓	Fluctuates
Respiratory Rate	Periodic breathing	Regular	Irregular
Blood Pressure	Slightly ↓	↓↓	Fluctuates
Skeletal Muscle Tone	Fluctuates	Stable	Fluctuates/↓
Alveolar Ventilation	Fluctuates with periodic breathing	Slightly decreased	Fluctuates
Apnea	Often present - ≤ 15 sec.	Absent	Frequent - ≤ 15 sec.
Ventilatory Response to Hypoxia	Slightly < awake	Slightly < awake	↓
Ventilatory Response to Hypercapnea	Slightly < awake	Slightly < awake	↓↓↓

Older vs. Middle-Aged Sleep

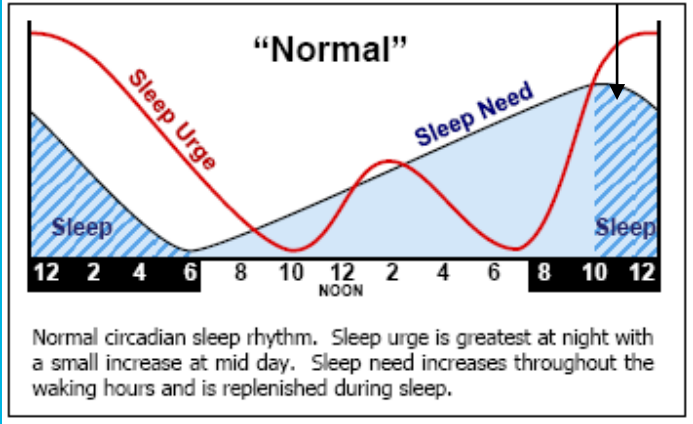


Circadian Rhythm

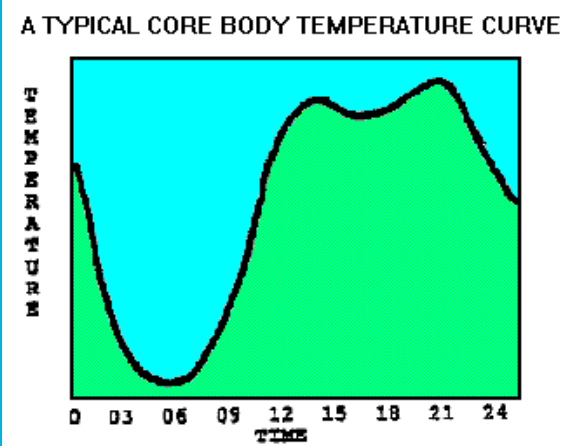


Circadian Rhythm

Diurnal rhythm - biphasic



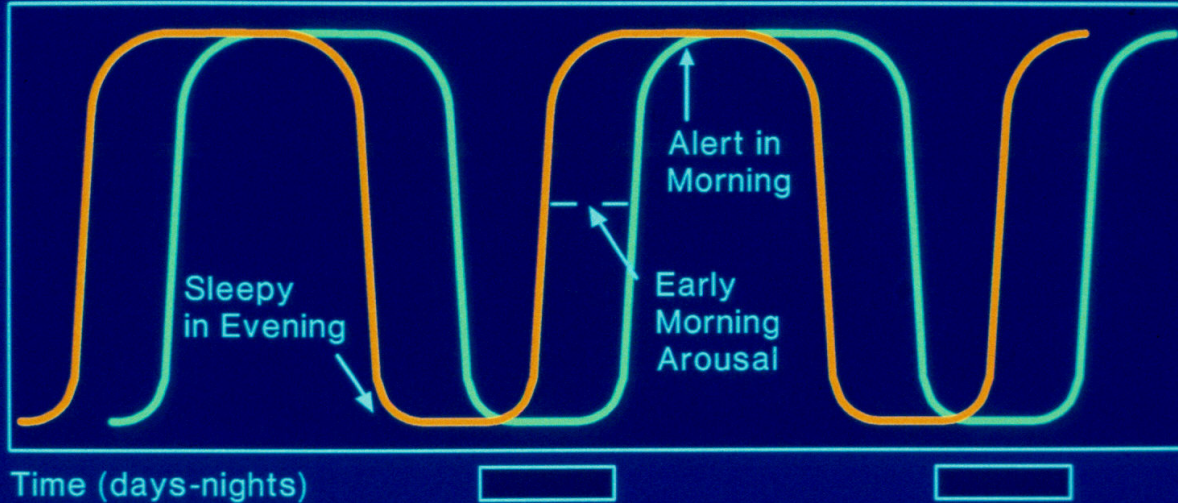
Body temperature sinusoidal



Advanced Sleep Phase

Bedtime Behind - Sleepy Phase Ahead

Sleep Tendency



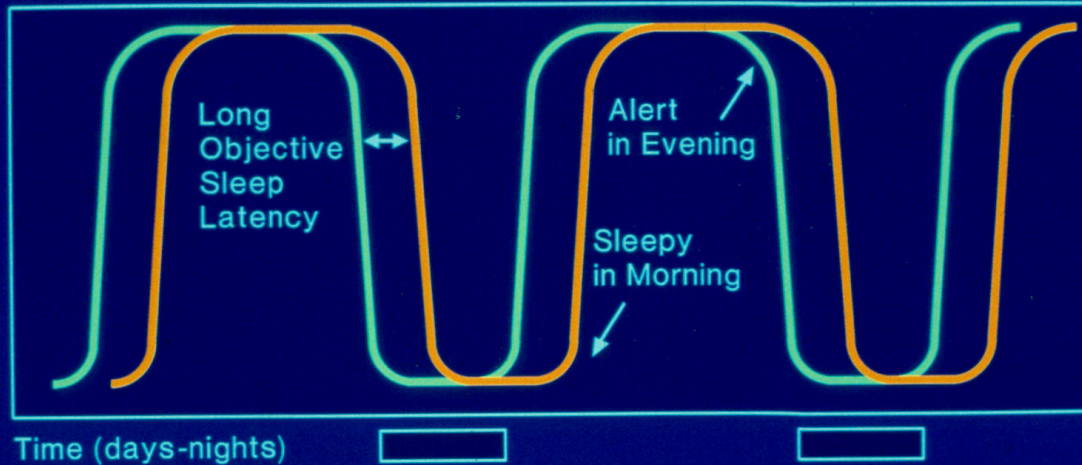
- Symptoms**
- Early morning arousal
 - Daytime fatigue especially late afternoon & evening

- Scheduled Bedtime Hours
- Circadian Sleep Tendency
- Desired Schedule

Delayed Sleep Phase

Bedtime Ahead - Sleepiness Behind

Sleep Tendency



- Symptoms**
- Can't fall asleep at night
 - Can't get up in morning
 - Tired all day except evening

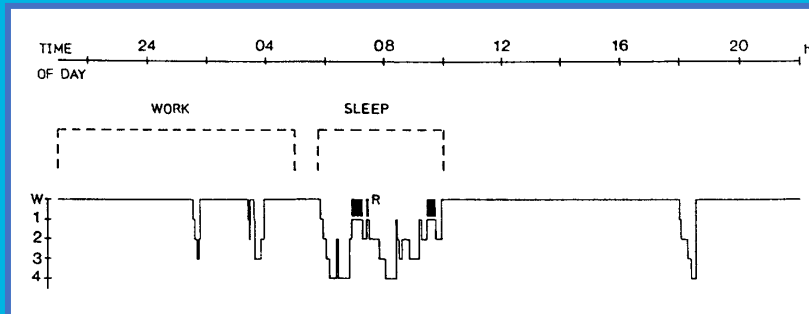
- Scheduled Bedtime Hours
- Circadian Sleep Tendency
- Desired Schedule

Shift Work - "Blue collar" jet lag"

Sleep monitoring on 20 nuclear power workers: 25% fell asleep while operating the plant - predominately on the night shift.

55% of night shift workers report nodding off or falling asleep at work at least once per week.

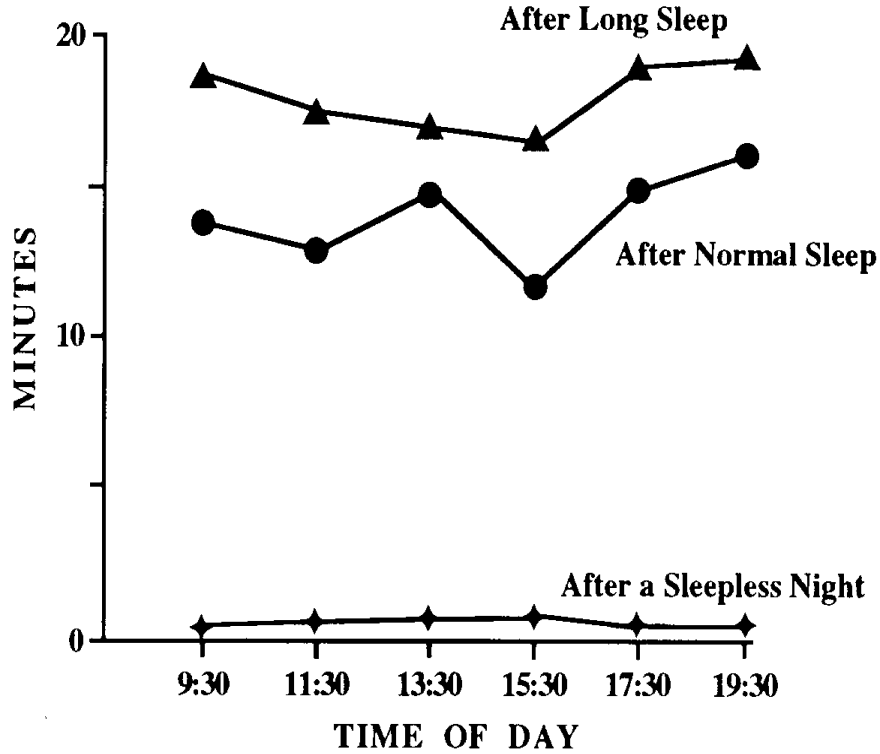
>30% report such incidents occur more than three times per week.



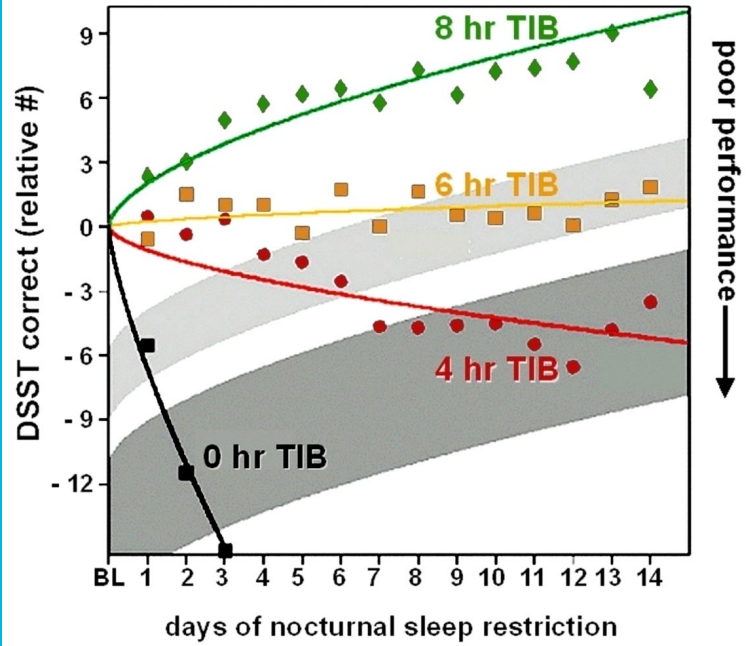
How much sleep do you need?



TIME REQUIRED TO FALL ASLEEP

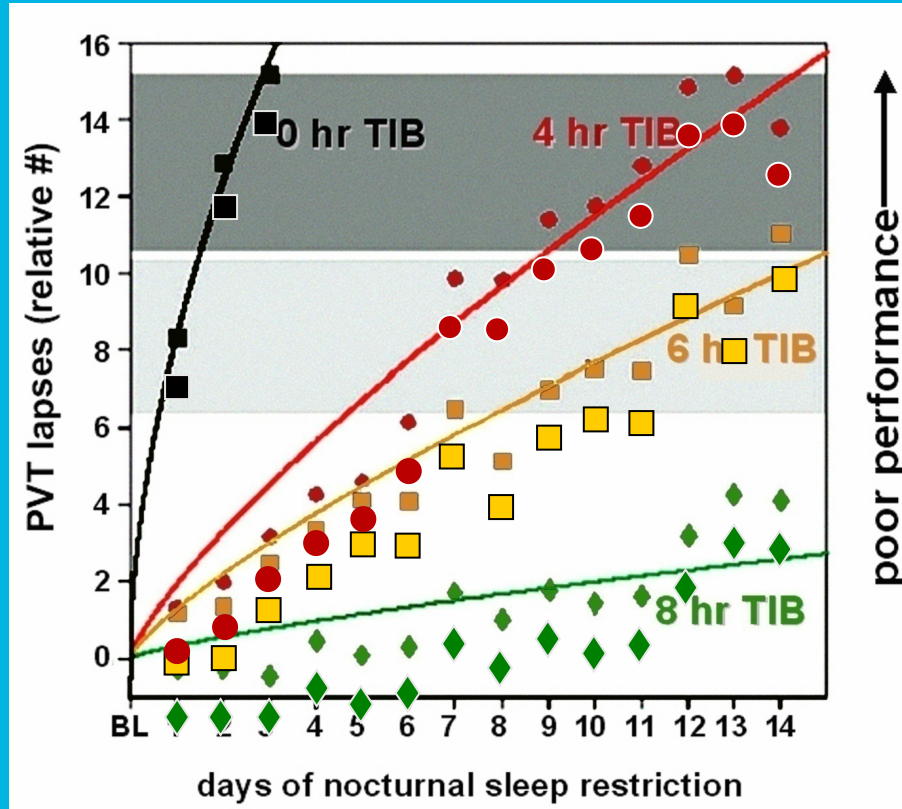


Sleep Loss and Cognitive Processing



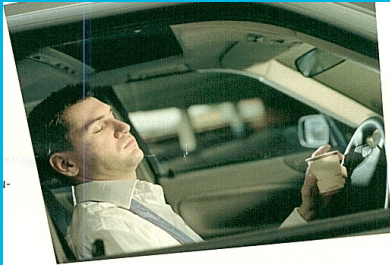
DSST
1 2 3
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Deficits in Behavioral Alertness Following Chronic Sleep Restriction



Van Dongen et al., Sleep, 2003

What happens when you don't get sleep?



Sleep Deprivation and Performance

Sleep deprivation causes little or no effect on our basic capacities to perform:

Vision

Hearing

motor skills

Learning

Memory

Using well-learned tasks or procedures

Sleep Deprivation and Performance

- When sleep-deprived persons are asked to perform almost any short-term task, and they are highly motivated to do so, they can do those tasks
- **HOWEVER**, what they **CANNOT DO** is intensively or extensively sustain their attention on any tasks

Sleep Deprivation and Performance

- The fundamental effects from sleep loss which permeate performance on virtually all cognitive and sustained attention tasks are not trivial.
- The most powerful determinant of lapsing and decreased performance in a sleepy person is required task duration.

Sleep Deprivation & Performance

- After about 18 hours without sleep, reaction time begins to slow from a quarter of a second to half a second and then longer.
- Microsleep--moments when you zone out for anywhere from two to 20 seconds

Sleep Deprivation & Performance

- Reaction time is roughly the same as someone with blood-alcohol level of 0.08 — high enough to get you arrested for driving under the influence in 49 states
- Two nights without sleep, performance dramatically decreases--beyond double what it was the first night. "You fall massively off the cliff." (Dr. David Dinges)

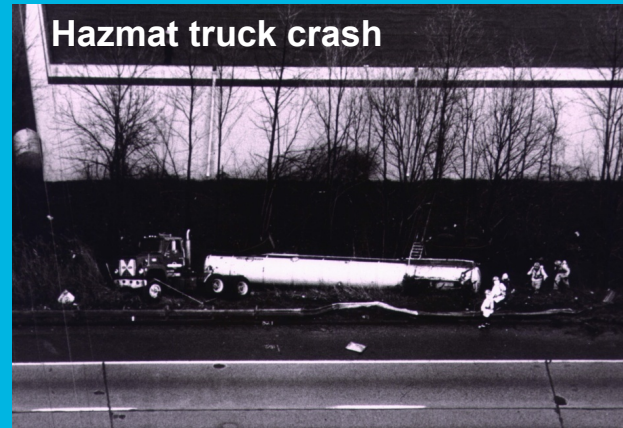
Sleep Disorders - Socioeconomic Consequences

- More than 100,000 motor vehicle accidents annually are sleep-related.
- Disasters such as Chernobyl, Three Mile Island, Challenger, Bhopal, and Exxon Valdez were officially attributed to errors in judgement induced by sleepiness or fatigue

Sleep Will Not Be Denied!



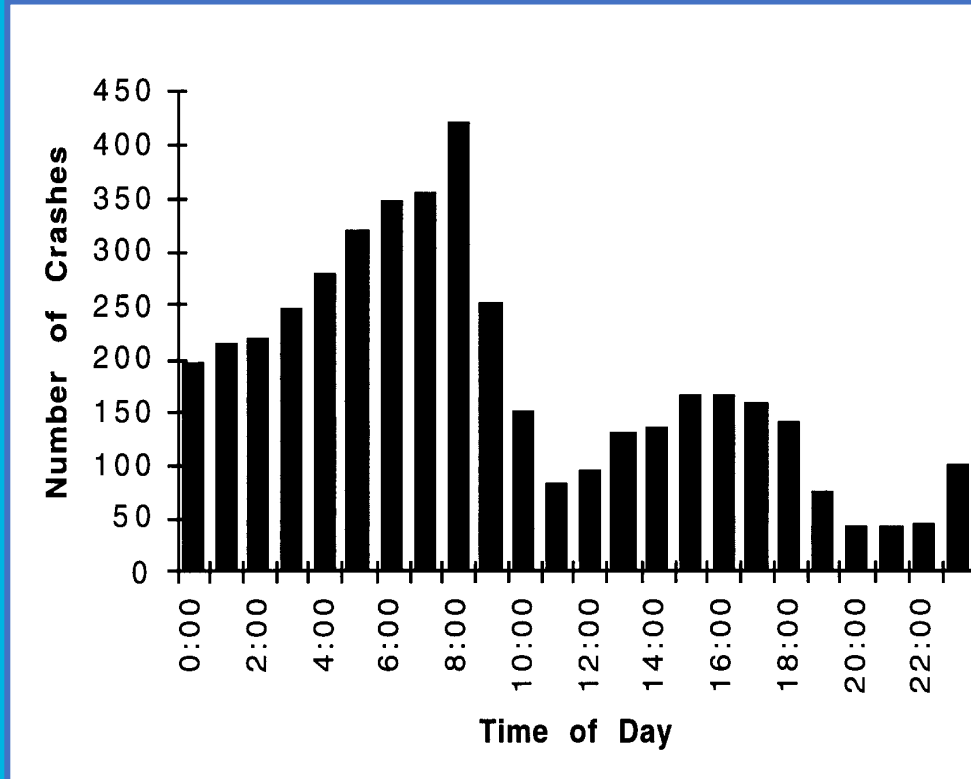
Buffalo Crash 2/12/09



Sleep Will Not Be Denied!



Accidents vs. Time of Day



Health Risks to Short Sleep Duration

Variable	≤ 5h	6 h	7h	8h (Ref.)	≥9h
Total CHD	1.82	1.30	1.06	1	1.57
Nonfatal MI	1.89	1.43	1.19	1	1.5
Fatal CHD	1.67	1.05	0.80	1	1.71

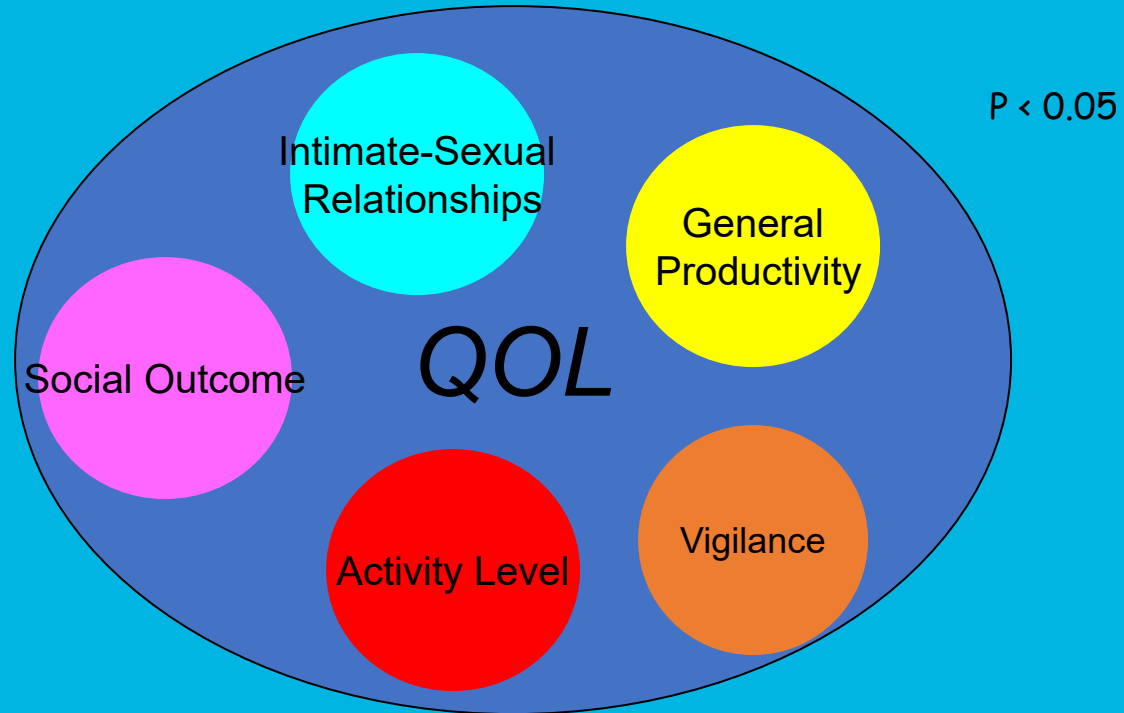
Variable	≤ 5h	6 h	7h	8h (Ref.)	≥9h
Total DM	1.57	1.27	0.98	1	1.47
Symptomatic DM	1.85	1.33	0.97	1	1.54

Ayas et al., *Diabetes Care*, 2007; Ayas et al., *Arch Int. Med*, 2003

How has sleep apnea affected relationships?

- Problems at work
 - Falling asleep
 - Coworkers not trusting their work quality
 - Getting fired
- Marital problems
 - Spouse being upset with them
 - Lack of interest in sexual relations
 - Divorce
- Restriction of social life
 - Too tired to do things with family or friends
 - Falling asleep early
- Embarrassment
 - Falling asleep in public
 - People think they lack interest in others
- Poor mood
 - Irritable
 - Impatient

Differences in QOL Between OSA Patients and Controls



Sleep Hygiene Measures

- Regular schedule, especially rise time
- Avoid stimulants, alcohol, caffeine, nicotine
- Set aside a worry time
- Keep sleeping room cool, dark, quiet
- Use bed only for sleep and sex

Sleep Hygiene Measures

- Limit naps to 30 min
- Avoid large meals; or emotional activities prior to retiring to bed
- Upon awakening, get up out of the bed, no matter what the time is
- Avoid looking at the clock - turn the clock around!

Websites for Sleep Information

- Sleep Net. Com - <http://www.sleepnet.com/>
- NIH - National Center on Sleep Disorders Research - <http://www.nhlbi.nih.gov/health/public/sleep/index.htm>
 - <http://www.nhlbi.nih.gov/health/prof/sleep/index.htm>
- American Academy of Sleep Medicine - <http://www.asda.org/>

Websites for Sleep Information

- NAPS - New Abstracts and Papers in Sleep
<http://www.websciences.org/bibliosleep/NAPS/>
- National Sleep Foundation - <http://www.sleepfoundation.org/>
<http://www.Sleepforkids.org>

Thank You!



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