

Sleep Disturbance as a Geriatric Syndrome

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Significance

- Sleep disturbance is common in older adults, often comorbid with other conditions, and is associated with important adverse health outcomes.
- Multiple underlying mechanisms of sleep disturbance may coexist in an older person, including age-related changes, multiple and interdependent risk factors, comorbidities, medications and other factors.

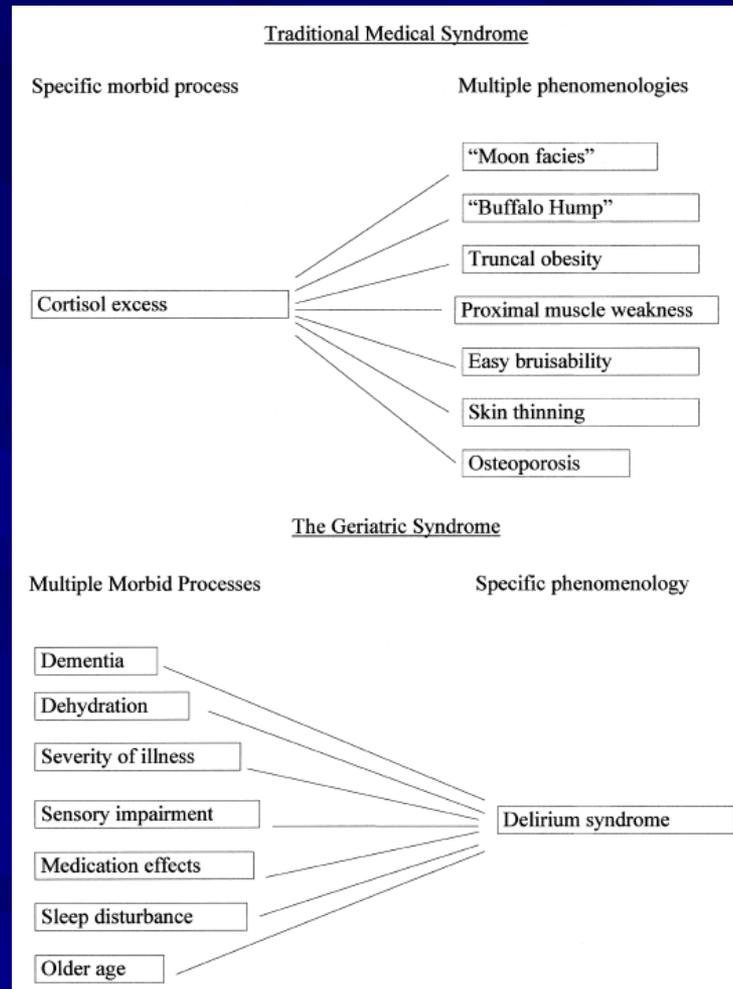
Consequences of sleep disturbance in the older adult: Insomnia as an example

- Increased health care costs
- Daytime functional impairment
 - Daytime fatigue and sleepiness
 - Slowed reaction time
 - Impaired balance and increased falls
 - Cognitive effects:
 - Slowed reaction times
 - Difficulties in recall, orientation and memory (short term and long term)
- Decreased quality of life
- Associated with increased mortality

What is a geriatric syndrome?

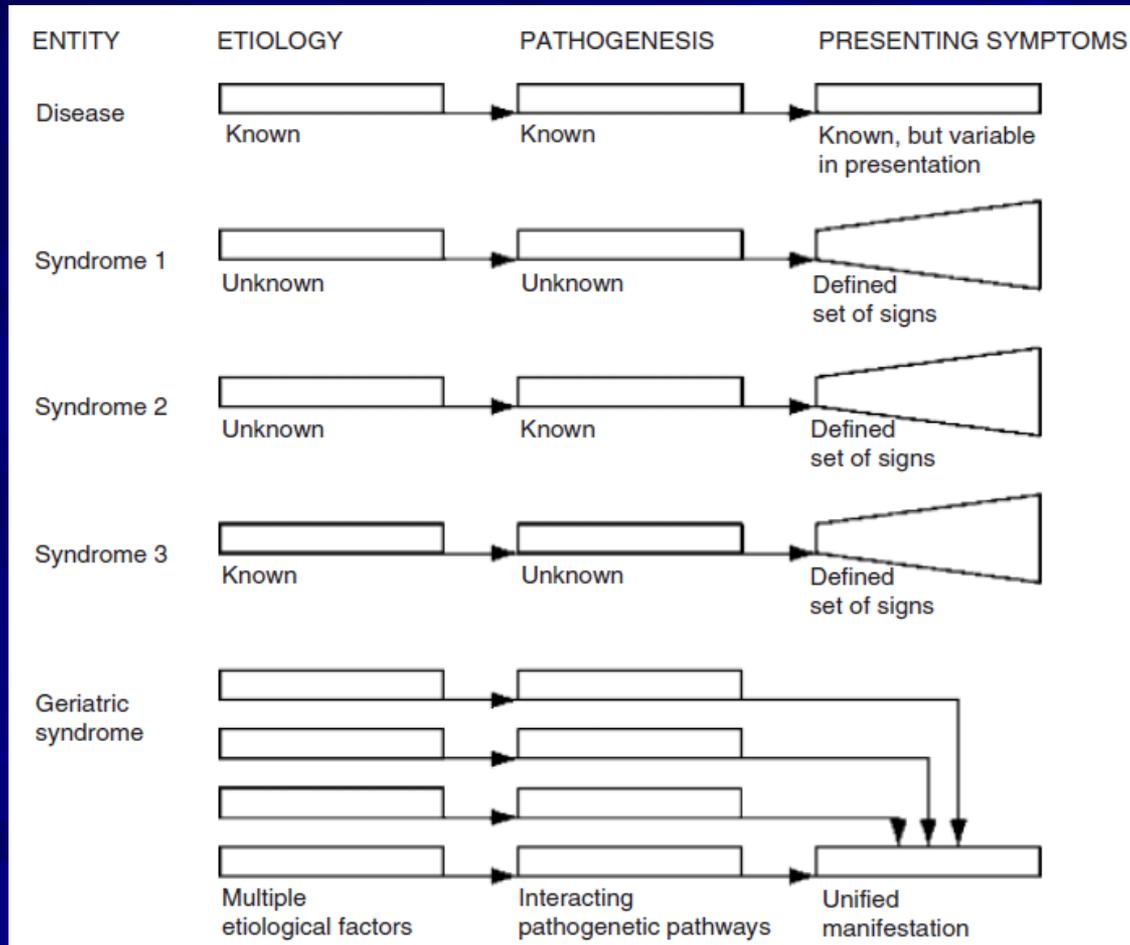
- “Multifactorial health conditions that occur when the accumulated effects of impairments in multiple systems render a person vulnerable to situational challenges” *(Tinetti et al. JAMA 273:1348-1353, 1995)*
- Examples:
 - Delirium
 - Falls
 - Urinary incontinence
 - Frailty
 - Functional decline

Comparison between traditional medical syndromes and geriatric syndromes



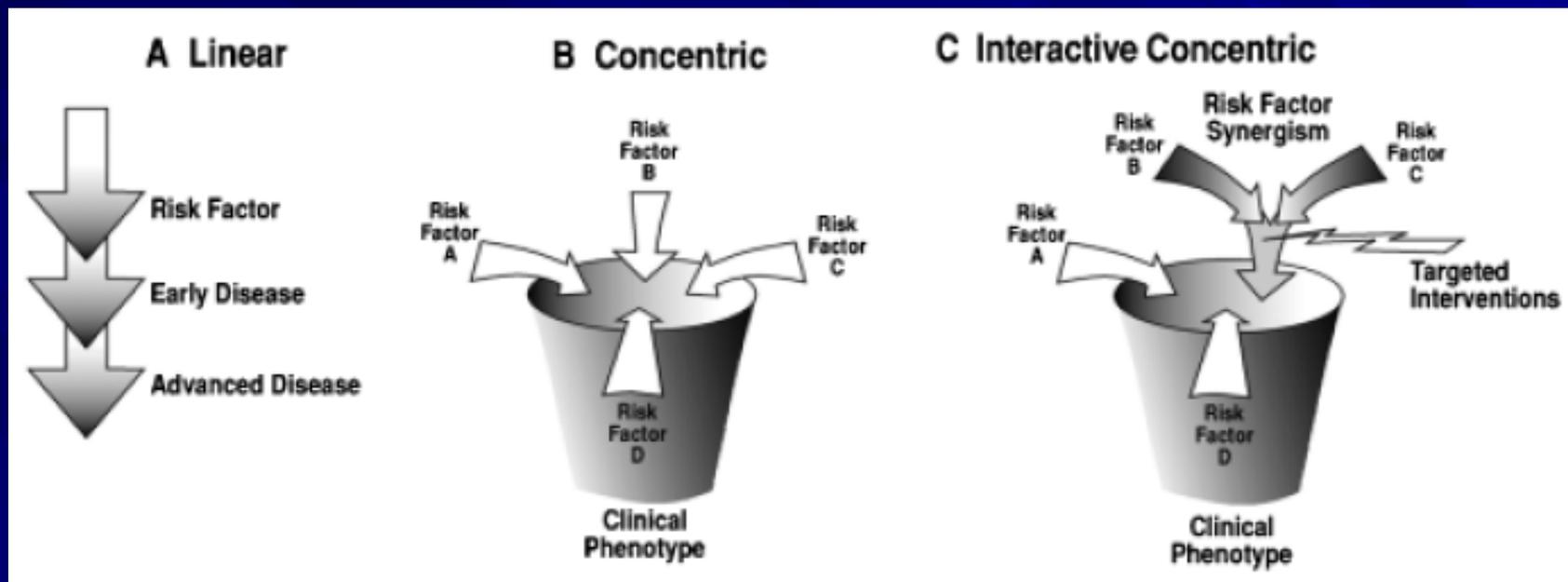
From: Flacker JM. *J Amer Geriatr Soc.* 51(4): 574-576, 2003

Comparison between 'disease', 'syndrome' and 'geriatric syndrome'



From: Inouye, Studenski, Tinetti, Kuchel. *J Amer Geriatr Soc.* 55:780-791, 2007; which was adapted from Olde Rikkert et al. *Neth J Med.* 61:83-87, 2003

Mechanisms/pathophysiology of geriatric syndromes: The Interactive Concentric Model



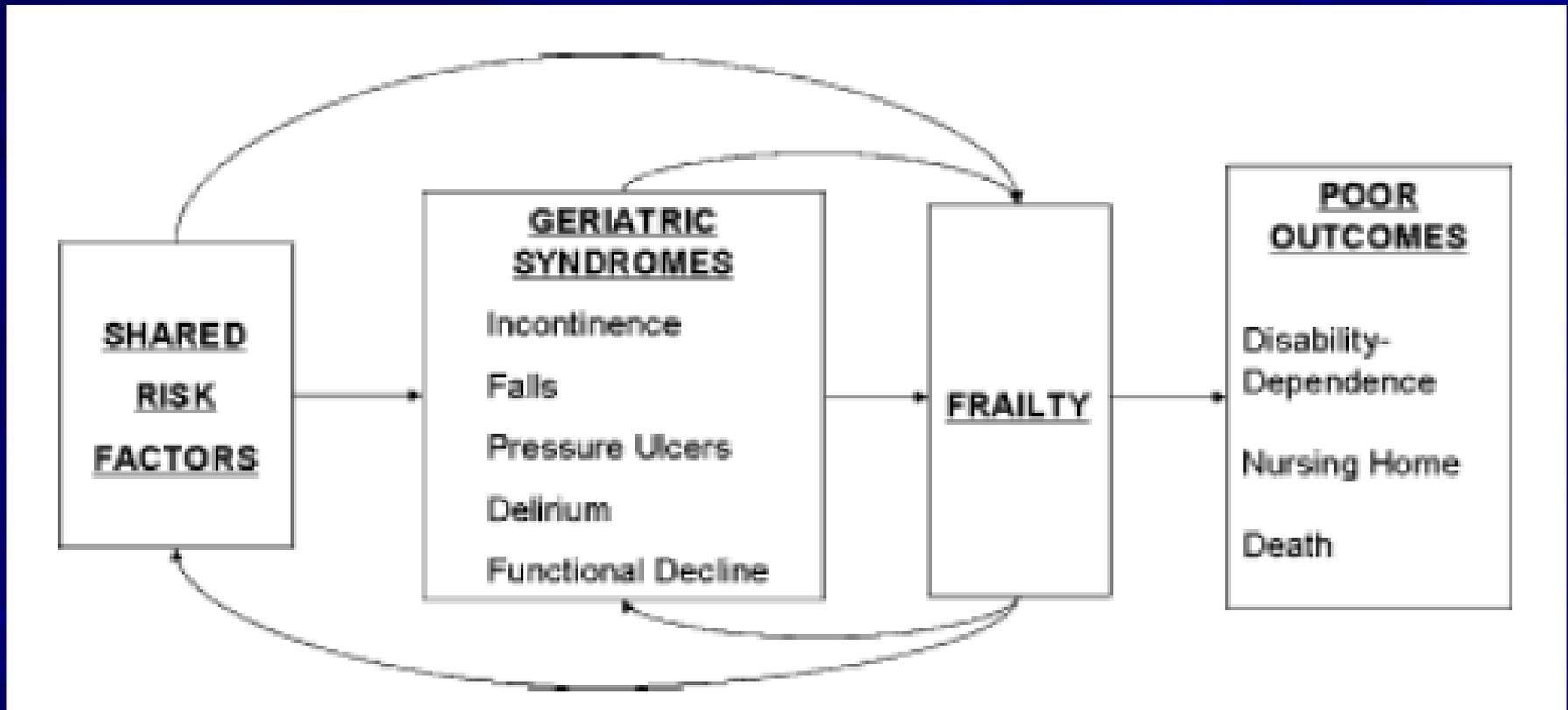
inborn error of
metabolism

cancer

geriatric syndrome

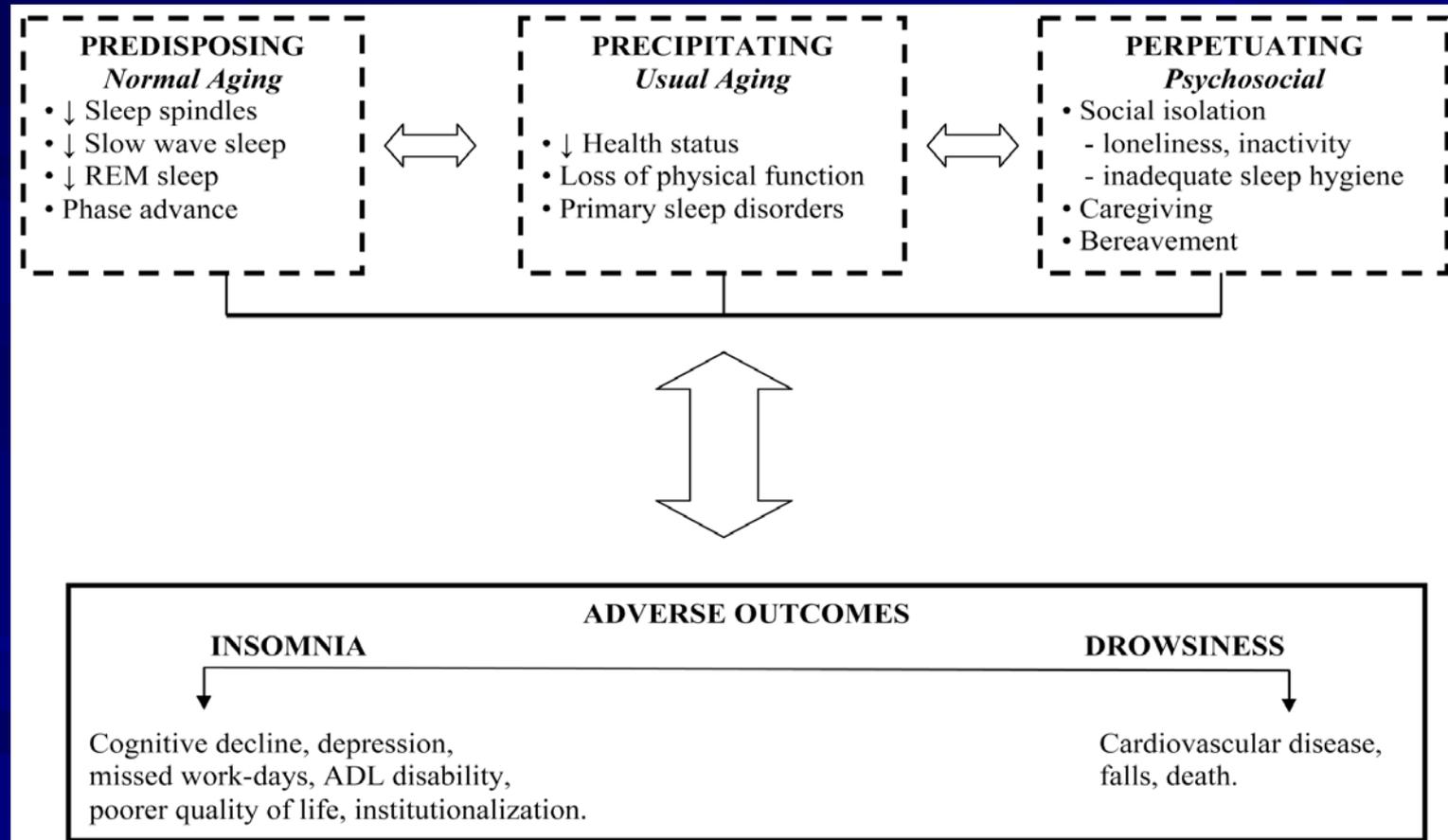
From: Inouye, Studenski, Tinetti, Kuchel. *J Amer Geriatr Soc.* 55:780-791, 2007

Conceptual model of shared risk factors for geriatric syndromes and poor outcomes



From: Inouye, Studenski, Tinetti, Kuchel. *J Amer Geriatr Soc.* 55:780-791, 2007

Sleep complaints in older adults as a geriatric syndrome



From: *Fragoso and Gill (Adapted from insomnia model from Spielman and colleagues). J Am Geriatr Soc 55:1853-1866, 2007*

Examples of comorbidity and sleep disturbance

- Mental health problems
 - Major depressive disorder
 - Generalized anxiety disorder
- Medical illness
 - Lung disease (e.g., asthma, COPD)
 - Chronic pain, arthritis
 - Heart disease, heart failure
 - Gastroesophageal reflux
 - Neurodegenerative disorders (e.g., dementia, Parkinson's disease, stroke)
- Polypharmacy, medication use or medication withdrawal
- Primary sleep disorders
 - Sleep-related breathing disorders
 - Circadian rhythm sleep disorders
 - Restless legs syndrome
 - REM sleep behavior disorder

Examples of medications and other agents that interfere with sleep

■ Drugs associated with insomnia:

- alcohol
- caffeine
- nicotine
- antidepressants
- asthma/COPD medications
- corticosteroids
- decongestants
- H2 blockers
- antihypertensives
- anticholinesterase inhibitors

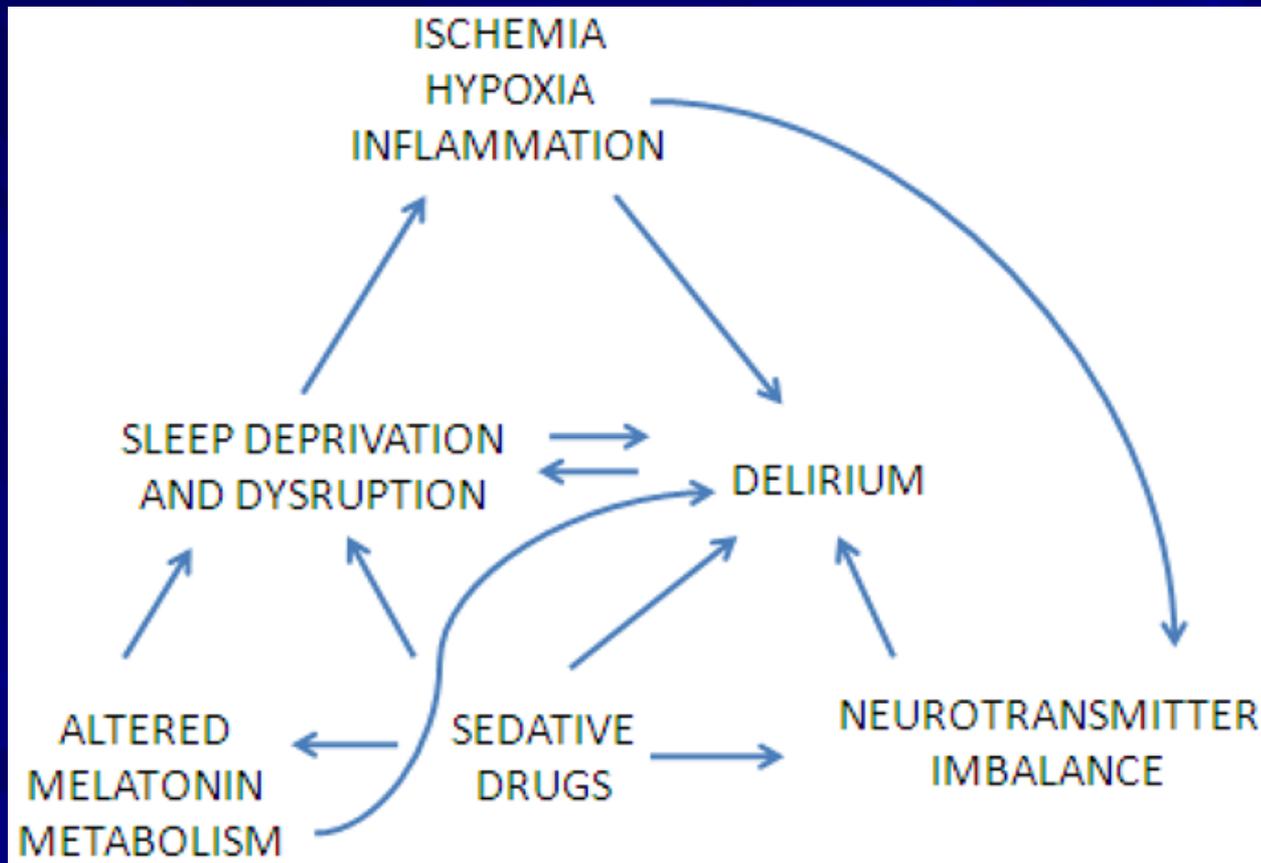
■ Drugs associated with daytime sleepiness:

- analgesics
- antidepressants
- antihypertensives
- antihistamines

Sleep and Delirium

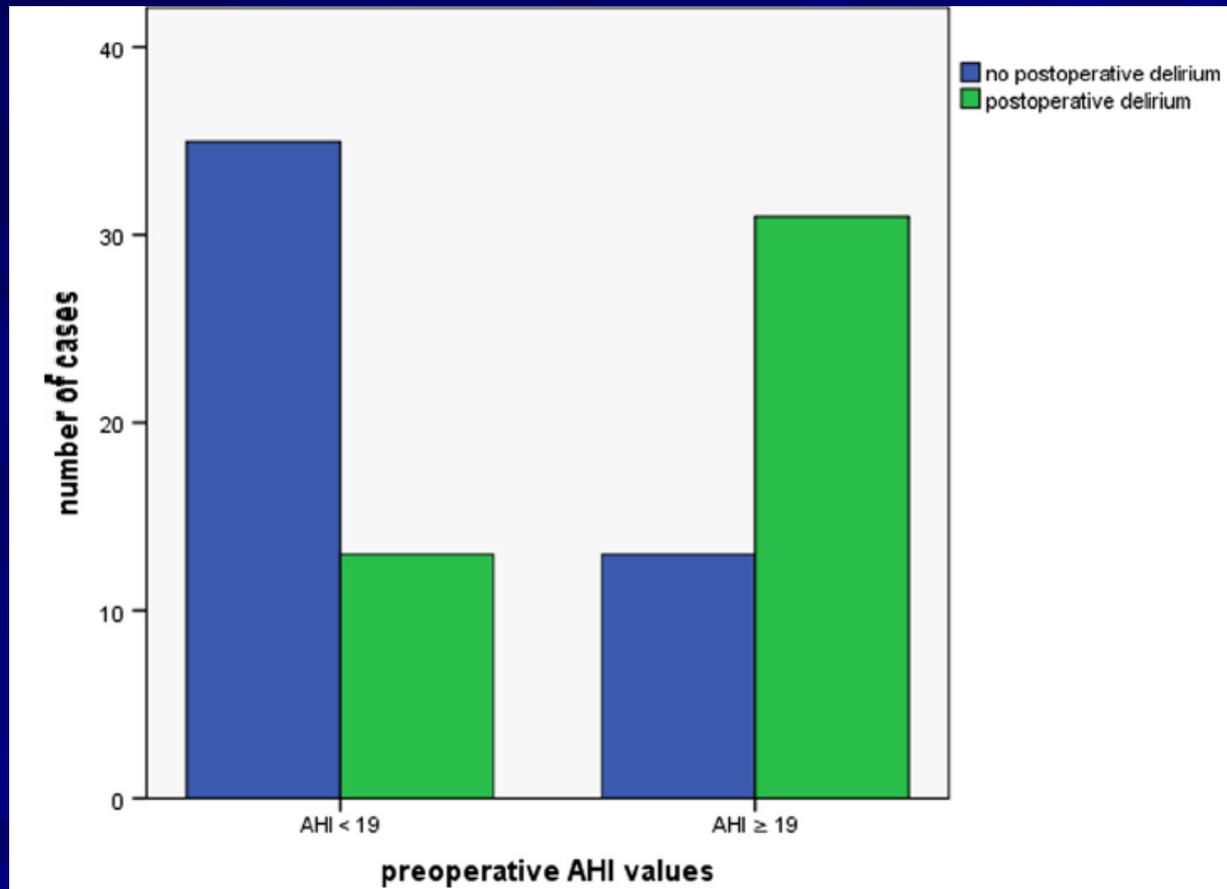
Sleep and Urinary Problems

Possible common pathways between delirium and sleep disruption



From: Watson, Ceriana and Fanfulla. *Best Prac and Res Clin Anaesthesiology*. 26:355-366, 2012

Sleep-disordered breathing is a risk factor for delirium after cardiac surgery



Roggenbach et al. Crit Care. 2014 Sep 5;18(5):477

Possible mechanisms of an association between sleep apnea and delirium

- Sleep stage abnormalities (as may occur with OSA) may increase the risk of delirium
- Hypoxia in OSA may lead to:
 - Vascular injury
 - Low grade systemic inflammation and oxidative stress
 - Decrease in insulin growth factor-1 (IGF-1)
 - These changes may be associated with neuronal injury and apoptosis, which may lead to cognitive dysfunction and delirium

Bidirectional relationship between urological symptoms and sleep

(Araujo, Yaggi, Yang, McVary, Fan, Bliwise. J Urol. 191(1):100-106, 2014)

- Prospective cohort study of 4,145 men and women in the Boston Area Community Health Survey
 - Population-based random sample survey
 - Self-report sleep and urinary symptoms
- At 5-year follow-up:
 - Increased odds of lower urinary tract symptoms for those with poor sleep quality and short sleep duration at baseline
 - Baseline nocturia predicted incident sleep-related problems at follow-up

Positive airway pressure treatment for sleep apnea in older adults improves nocturia (Margel et al. *Urology* 67:974-5, 2006)

- Prospective observational study
 - N = 97 patients diagnosed and treated with CPAP for OSA (mean age 55 ± 12 years)
- Findings:
 - 73 (80%) patients reported improvement in nocturia with CPAP
 - Mean number of awakenings to urinate per night:
 - At home: Baseline = 2.5 (SD 2.4); after 1-3 months of CPAP treatment = 0.7 (SD 0.6); $p < .001$
 - In sleep lab: During initial sleep lab testing = 1.1 (SD 0.9); during CPAP titration = 0.5 (SD 0.6); $p < .001$

Knowledge Gaps

- A traditional disease model approach underestimates the complexity of sleep disturbance in many older adults.
- The complexity of sleep as a geriatric syndrome makes it difficult to conceptualize and investigate underlying pathophysiologic mechanisms.
- Narrowly focused research on a single risk factor may limit relevance and generalizability to the geriatric population.
- Broadly focused research that attempts to consider all/most relevant risk factors may provide unfocused/diluted results.

Research Opportunities

- Studies designed to understand the pathophysiologic complexity and multifactorial nature of sleep disturbance in older adults are needed.
- Research into sleep disturbance as a geriatric syndrome with shared risk factors with other geriatric syndromes (e.g., delirium, urinary incontinence) may help us understand pathways to frailty and adverse health outcomes, and guide development of new multicomponent interventions.