

SLEEP REGIMENS

- During hospitalization, repeated arousals disrupt sleep continuity (*Aurell J et al BMJ 1995; Orr WC et al Am J Cardiol 1977; Richards KC et al Heart Lung 1988*) with an estimated disruption occurring every 20 minutes in the ICU (*Hilton AB et al, J Adv Nurs 1976*). Daytime sleep accounts for 50% ICU sleep, but lacks delta sleep & REM necessary for restful sleep and healing (*Broughton R et al, EEG & Neurophysiol 1987; Aurell J et al, BMJ 1995*). ICU pt spend <6% time in REM (*Freedman NS et al, AJRCCM 2001; Knill RL et al, Anesthesiol 1990*), resulting in a loss of stages 3 & 4 sleep, which is the physiologically “stable” sleep.
- Absence of diurnal light cycles results in sleep disruption, which leads to cognitive disturbances such as delirium/ ICU psychosis (*Monk TH et al, Sleep 1997; Fontaine DK et al, Crit Care Nurs 2001*). Inability to distinguish night & day leads to these cognitive disturbances (*Dracup K et al, Appl Nurs Resear 1988*)
- Numerous medications contribute to the development of sleep disturbances. Anti-hypertensives affect sleep through excess daytime somnolence and dream disturbances. Beta-blockers, clonidine, diuretics, ACE inhibitors, calcium-channel blockers have all been implicated (*Nicholson A et al, Sleep Med 1994*). Benzodiazepines suppress stages 3 & 4, while opiates suppress REM sleep.
- Disturbances in sleep result in numerous deleterious physiological disturbances. Sleep deprivation promotes a negative nitrogen balance & ↑ REE, ↑ CO₂ production & O₂ utilization (*Parthasarathy A et al, AJRCCM 2002; Irwin C et al, Crit Care Med 2002*). Sleep deprivation suppresses antibody & cell-mediated responses (*Brown R et al, Behavioral Immunol 1989; Dinges DF et al, J Clin Invest 1994; Irwin C et al, Crit Care Med 2002*). Sleep disturbances also result in decreased functional vital capacity, maximal voluntary ventilation & hypercapnic and hypoxic ventilatory responses (*Cooper KR et al, J Appl Physiol 2002; Horne JA et al, Ann Clin Resear 1985 Helton*), as well as decreased respiratory muscle endurance and impaired weaning from mechanical ventilation (*Schiffman PL et al, Chest 1983; Chen H et al, Am Rev Resp Dis 1989; Meyer TJ et al, Chest 1994*)

PHARMACOLOGIC OPTIONS

- **Chloral Hydrate**- Works via metabolite trichloroethanol. Used to induce sleep for polysomnography. Capable of inducing sleep without respiratory depression. No change in RR, PaCO₂, PaO₂, Vt. Among a group of hypnotics, only chloral hydrate was the only drug among elderly patients to be effective in inducing & maintaining sleep. (*Pakes SL et al, Drugs 1989; Neufield J et al, EEG & Clin Neurophysiol 1994; Leiter JC et al, Am Rev Resp Dis 1990*)
Rx- 500 mg PO/PT qhs (may increase to 1,000 mg if necessary)

- **Ambien® (zolpidem)**- Chemically UN-related to benzos, but selectively binds to omega receptor in brain. Absence of anxiolytic, anticonvulsant, myorelaxant effects. Preserves stages 3 & 4 sleep and REM sleep. May be the ideal hypnotic? (*Langtry HD et al, Drugs 1990; Steens RD et al, Sleep 1993*)
Rx- 5mg PO/PT qhs (may increase to 10 mg if necessary)
- **Remeron® (mirtazapine)**- Noradrenergic, specific serotonergic(5-HT₂). Superior effect on insomnia, appetite, anxiety. PRCT of 298 pts mirtazapine & 285 SSRI, mirtazapine had quicker onset & more sustained response of secondary symptoms. Improved sleep variables in young, healthy volunteers compared to their baseline. Placebo vs. mirtazapine, improved sleep latency, increased “deep” stages sleep, & increased total sleep time with mirtazapine. (*Aslan S et al, Sleep 2002; Pinder RM et al, J Clin Psych 1997; Linolia RM et al, International Pharmacopsych 2000; Raji MA et al, Ann Pharmacotherapy 2001*)
Warmer S et al, Pharmacopsychiatry 2001)
Rx- 15mg PO/PT/dissolving tablets!!! qhs (may increase to 30 mg if necessary)
- **Desyrel® (trazadone)**- Effective hypnotic for depressed patients with sleep complaints. Well tolerated, decreased awakenings, deeper sleep stages attained. 74 pts with PTSD randomized to trazadone or fluoxetine, trazadone better tolerated, better reported sleep quality & EEG sleep (*Warmer M et al, Pharmacopsychiatry 2001; Antilla SA et al, CNS Drug Rev 2001*)
Rx- 50mg PO/PT qhs (may increase to 100mg if necessary)