Restorative Undisturbed Sleep
A Key to Good Health
Objectives

• Explain the etiology of sleep and wake in humans

• List the top ten disturbances to sleep in humans

• Implement at least ten interventions to reduce disturbances to sleep in skilled nursing homes

• Implement at least five interventions to assist in keeping residents awake and engaged during the day
How’d we get here?

- We completed a three year PIIPP Fall Prevention program in 2011 to investigate and identify the root causes of resident falls in 16 skilled nursing facilities.

- From the Fall Prevention Program, we identified that sleep fragmentation at night and the lack of activity during the day were significant conditions that contributed to residents falling.

- We spring boarded off of our previous PIIPP Fall Prevention Program into Restorative Sleep.

- We needed to become knowledgeable in the science and etiology of sleep and wake.
External lesson learned:

if we can stop the noise, then we can reduce the falls.
Internal lesson learned:

if we can stop disturbing sleep then we can reduce the falls.
Background & Process

- Empira awarded 3-year MN DHS PIPP grant, began 10/1/11
  ~ Project: to implement best practices from evidence-based, research studies in sleep hygiene science to improve the sleep and awake times of our residents
  ~ Goals: Undisturbed sleep at night; Awake and engaged during the day
- 23 SNFs, 4 companies participate in PIPP, RSVP project
- RSVP Leader in each SNF reports to administrator who oversees the program – it’s not a nursing program!
- Project funding completion date: 10/1/14
Restorative Sleep Vitality Program: RSVP Goals

- Undisturbed sleep at night
**Restorative Sleep Vitality Program: RSVP Goals**

- Fully engaged, awake during the day
CMS and LTC providers have never considered sleep as an integral part of the plan of care and services provided for the resident.

MDS 3.0: “Over the last 2 weeks, did the resident have any of the following problems: trouble falling or staying asleep, or sleeping too much?” and “How important is to you to go to bed when you want?”
Empira’s (RSVP)  
Restorative Sleep Vitality Program

- This program is a combination of nationally recognized, evidence-based, sleep science research studies and the application of cutting edge practices to enhance residents’ sleep & wake

- Empira is challenging some of the standards of practice, regulations and operational procedures for providing cares and services in skilled nursing facilities

- Empira staff and corporate representatives attend national & international sleep conferences and conventions to learn and educate membership
So,

How Do We Sleep?
How Do We Wake?

• The Etiology of Sleep and Wake:
Measurements and Tests for Sleep:

• Sleep, its stages and characteristics, are assessed by tests in sleep labs.

• Tests that identify the sleep and wake cycles include, Polysomnography:
  
  Electroencephalogram (EEG) measuring the electrical activity of the brain, or brain waves
  
  Electrooculography (EOG) measuring eye movements
  
  Electromyography (EMG) measuring the skeletal and muscle activity/tonicity

Vital signs

• Actigraphy
Actigraphy:

- Measures Rest and Sleep Quality and Quantity
- Measures Activity and Tonicity levels
- Measures Light Source, Quality and Quantity of Light source
- Worn continuously for multiple days
- Over a 24 Hour period
- Worn on the wrist
- Cost effective
Sleep Data & Measurement

- Bed Time
- Get Up Time
- Time Spent in Bed at Night
- SE – sleep efficiency (time in bed ÷ time asleep)
- SL – sleep latency (time elapsed from lights out to sleep onset)
- WASO – wake after sleep onset
- TALT – time above light threshold
- Naps – prevalence and duration
- Night Disruptions or Sleep Fragmentation – number of times sleep is disturbed
Circadian Rhythm: the body’s internal clock

An inborn, internal, 24-hour cycle of change and fluctuation of the physiological, behavioral and emotional functions of the human body.
Serotonin secretion starts at 8:00 PM.

Human Biological Clock: Ideal 24 Hours

- Lowest blood pressure at 04:30 AM.
- Deepest sleep at 02:00 AM.
- 20:00 Serotonin secretion stops at 8:00 PM.
- 21:00 Melatonin secretion starts.
- 00:00 Midnight
- 02:00 Deepest sleep
- 04:30 Lowest body temperature
- 06:00 Greatest healing and growth occurs
- 06:45 Sharpest rise in blood pressure
- 08:30 Bowel movement likely
- 09:00 Highest testosterone secretion
- 10:00 High alertness
- 12:00 Noon
- 14:30 Best coordination
- 15:30 Fastest reaction time (3:30 PM)
- 16:00 Greatest cardiovascular efficiency and muscle strength
- 17:00
- 18:00 (6:00 PM)
- 18:30 Highest blood pressure
- 19:00 Highest body temperature
- 20:00 Serotonin secretion stops (8:00 PM)
- 22:30 Bowel movements suppressed
Sleep: Cycles & Stages

- In humans, an average 7 – 8 hour night’s sleep should contain 4 – 5 sleep cycles.
- Each cycle should last 90 to 120 minutes.
- Each cycle has 3 Non-REM stages and 1 REM stage of sleep.
- Each stage provides distinct physiological and emotional benefits for the body.
One night of 7–8 hours of sleep
Sleep: Stage 1

- Stage N1 lasts 5-15 minutes. N1 is the transition stage of the brain from fast active brain waves (as in the awake state) to slower brain waves.

- Muscles begin to relax and lose tonicity. Sometimes sudden twitches and jerking may occur.

- Eyes move more slowly, the heart begins to slow down, breathing becomes deeper and slower.

- The person is still easily awakened and easily reacts to environmental noise.
Sleep: Stage 2

- Stage N2 occupies 45–55% of total sleep for adults.
- Muscular activity decreases more, eye activity stops or rarely moves, heart rate significantly slows and conscious awareness of the external environment disappears.
- Brain waves continue to slow down.
- The person is not as easily aroused from this level of sleep and usually only reacts to loud or selected noises in the environment.
- This stage has brief image dreams that the brain works to: save, file, trash.
Sleep: Stage 3

• Stage N3 is deep sleep or slow-wave sleep. The brain is completely at rest. All eye movement and muscle activity ceases.

• Stage N3 is where the greatest amount of skin, deep tissue and overall healing and regeneration of the human body occurs.

• The greatest amount of healing occurs at this stage due to the greatest formation of white blood cells, T4 cells, red blood cell re-oxygenation and cellular repair and regeneration.

• It is very difficult to wake someone from this deep sleep stage.
REM sleep: (Dreaming)
Rapid eye movement sleep

- Rapid eye movement sleep, or REM sleep, accounts for 20–25% of total sleep time in most human adults.
- Respirations become very rapid, irregular and shallow. The heart rate increases and the blood pressure rises.
- REM sleep includes rapid eye movements as well as a very rapid brain wave activity similar to being awake.
- This stage is associated with healing the emotional and psychological health of the body. Episodic dreams and long stories, relieve stress, process emotions, detox our feelings of: fear, anger, happy and sad. It also cements memories.
- Muscular paralysis occurs to protect organisms from self-damage through physically acting out the often vivid dreams that can occur during this stage.
The elderly adult: ← One night of 8 – 9 hours of sleep →

1 stage

2 stage

1 stage

2 stage

REM stage

← Cycle →

← Cycle →
Effects of Sleep deprivation

- Irritability
- Cognitive impairment
- Memory lapses or loss
- Impaired moral judgement
- Severe yawning
- Hallucinations
- Symptoms similar to ADHD
- Impaired immune system
- Increased heart rate variability
- Risk of heart disease
- Increased reaction time
- Decreased accuracy
- Tremors
- Aches
- Risk of diabetes Type 2

Other:
- Growth suppression
- Risk of obesity
- Decreased temperature
How does the body sleep & wake?
It begins by . . .

- Light or darkness → enters the eye → to the retina →
- Travels from the retina → the optic nerves → then
- Sent into the brain → the human internal clock, the 
suprachiasmatic nucleus (SCN) which is located in the 
middle of the brain, just above and behind the eye 
sockets → then the
- Nerve message is transmitted → the pineal gland
- Pineal gland either secretes melatonin or sends 
messages to the body to secrete serotonin in response 
to the darkness or lightness messages it is receiving.
Light: Sets the Human Clock

- We need 30 minutes of direct, full sunlight each day to set our circadian rhythm: 10,000 lux
- Or 60 minutes of indirect sunlight
- Or 120 minutes of filtered/overcast sunlight
- The sunlight (direct, indirect or filtered) needs to hit the retina of the eye
- Therapeutic artificial light to replace or enhance the lack of sunlight has had mixed success for setting the circadian rhythms

Does not require continuous, uninterrupted times.
Melatonin = hormone

Serotonin = biochemical
Melatonin: sleep hormone

- Melatonin is a hormone. It is secreted by the pineal endocrine gland in the brain. It’s shape is a tiny pine cone.

- The pineal gland, receives electrical messages to secrete melatonin which then sends information about the lighting levels to other parts of the body to either induce sleep (more melatonin) or to wake up (less melatonin).

- Melatonin is triggered by darkness:
  - Darkness = more melatonin produced; heart rate slows, body temperature drops, eyes stop moving, brain waves slow, blood pressure lowers, peristalsis relaxes, muscles relax, etc.
  - Lightness = less melatonin produced; reversal occurs
Serotonin: wake biochemical

- Serotonin: “happy, feel good” biochemical.
- About 90% of human body's total serotonin is located in the gastrointestinal tract, where it regulates intestinal movements and digestion.
- The remaining 10% is stored in the brain where it regulates mood and provides a sense of well-being and happiness.
- It also helps to regulate appetite, wakefulness, sleep, and the cognitive functions of memory and learning.
- Serotonin is also a growth factor for some cells, which gives it a role in healing, especially wound and skin healing.
- Serotonin is triggered by bright light. More light = more serotonin produced Less light = less serotonin produced.
But it’s not just the brightness or intensity of light that affects sleep and wake, it’s also the color of the light!
Color Measurements

- We perceive color depending upon the speed and wavelength of each color.
- Violet light has a shorter, more rapid wavelength than the longer, slower wavelength of red light.
- The visible colors from shortest to the longest wavelengths are:
  - violet →
  - blue →
  - green →
  - yellow →
  - orange →
  - red →
Color Illumination: Research Findings

- Research results:
  - “The use of color illumination is more important than the reduction of brightness to induce rest.”
  - “Subjective drowsiness results indicate that the reduction of illuminance without reduction of the blue color should be avoided.”
Color Illumination: Research Findings

- The popular treatments for sleep disorders today focuses on “blue light in the morning.”

- Research consensus includes “avoiding blue light within two hours of sleep.”

- Researchers agree: the more rapid wave length of blue light can delay the onset of sleep because it suppresses melatonin, increases cardiac output, increases all vital signs and increases brain wave activity.
Color Illumination: Research Findings

- Research indicates that slower wave length light (red, amber, yellow) creates a gentle, gradual lowering of the central nervous system activity and a lowering of brain wave activity.

- Red, amber, yellow light would be more effective in a bedroom at night or a similar environment where it is desirable to lower mental and physiological activity.
Color of lighting in our environment:

- Candle light / fire place
- Older incandescent bulb
- Fluorescent lights
- White (sunlight) light bulbs
- Energy efficient bulbs
- Cell phones
- HD flat screen TVs
- Computer/laptop screens
- Halogen lights
- LED lights
Activity, Movement, Exercise: Influences on Sleep & Wake

- How much should we move, exercise?
- When do we move, exercise?
*Human Body is like a Rechargeable Battery

• Manufacturers recommendation on rechargeable battery:
  “To extend the life of the battery: fully exhaust or run down the battery prior to recharging.”

• When we sleep we recharge our cells, but we need to run down the cells during the day, to get the best recharge at night.

• We get better sleep at night, when we are physically exhausted from the day’s activities.
Implementing the Empira RSVP, Assessment:

• What disturbs sleep at night?
  - Identify environmental factors.
  - Identify internal factors.
  - Identify operational factors.

• Why don’t people stay awake at day?
  - Identify environmental factors.
  - Identify internal factors.
  - Identify operational factors.
Implementations & Solutions: Prevent Disturbances to Sleep

• What are the root causes for the disturbances to residents’ sleep? Why do residents not sleep at night?

• Why are residents not more active during the day?

• Prioritize:
  • Leadership supports it and makes it a priority
  • Educate staff, residents, families, MDs, surveyors
  • Grab the greatest impact, low hanging fruit first
  • Do the easier, quicker successes first
  • Then take on the greater challenges
Program Roll Out – Eliminate Disturbances of Sleep

What disturbs sleep the most?
Top Disturbances to Sleep

1. Noise
2. Light
3. Sleeping Environment: surface, bedding, temp, aroma
4. Napping
5. Medications
6. Continence Needs
7. Pain
8. Positioning
9. Inactivity/activity
10. Diet/Hydration

Harvard Sleep Study, 2011
Noise: Goals

• We attacked noise in our Fall Prevention program:
  – Audited and monitored sound levels with the use of sound meters
  – Identified root causes and types of noise
  – Eliminated all residents’ personal alarms
  – Reduced noisy times: shift change, meals, rounds
  – Reduced noisy areas: nurses’ stations, dining rooms, kitchens
  – Identified specific loud speaking staff
  – Turned off TVs when not being watched, encouraged use of private TVs w/ headsets
  – Ongoing use of “Yacker Trackers”
Lighting: Goals

- **Automatic timers/dimmers:** set lights to go on and off at specific times

- **White/blue spectrum, higher intensity level,** lighting during day time (8 am → 8 pm)

- **Amber/red spectrum lights, lower intensity level,** lighting at night (8 pm → 8 am)

- **Hug lights and hammerhead lights** used by night staff, flashlights with amber light

- **Pathway motion detector lights** at night
Sleep Surfaces

- Have pressure relieving mattresses:
  - Static pressure redistribution mattresses
  - Low airflow, high density mattresses
- Pillows:
  - Appropriate for side or back sleepers, full body
  - Soft, firm, extra firm pillows
  - Residents pillow from home
- Sleep wear:
  - Fabric content
  - Fit
Sleep Surfaces

• Selecting a Pressure Redistribution Mattresses (NPUAP, 2014) [http://www.npuap.org/resources/educational-and-clinical-resources/prevention-and-treatment-of-pressure-ulcers-clinical-practice-guideline/]

• Use high specification reactive (deforms in response to applied load) foam mattress for residents at risk for pressure ulcer development (characteristics of high specification foam mattresses, pages 109-110, NPUAP, 2014)

• Use active (alternating pressure) support surface (overlay or mattress) for residents at high risk of pressure ulcer development when frequent manual repositioning is not possible
NAPS

- **Naps rob the sleep at night**
- **Naps rob stage 3 sleep**
- One 30 – 40 minute nap during mid-day is rejuvenating and beneficial to health & longevity
- Consistently napping for longer periods, nearly every day, results in an increase of illnesses and a shorter life expectancy
- Consolidate the sleep experience so you sleep deeply at night and stay awake during the day
Medications:

- Schedule meds not to awaken sleeping resident at night
- Identify which medications support sleep and which medications disturb sleep
- Give medications during day time that have positive effect on wakefulness & medications in the evening that help sleep
- Consider liquid meds in evening and night to reduce fluid intake
Pain

* RCA: source and reason for pain

- Alternative comfort and pain relieving interventions other than medications
- Medicate to facilitate pain relief AND sleep
- A long acting pain medication lasting throughout night time sleep – given prior to sleep!
- Schedule routine rather than PRN meds
Incontinence: Hydration control & Product use

- Bulk fluid intake in the morning, taper down after lunch, least fluids at dinner (8, 6, 4 oz)
- Discourage fluids after the evening meals unless medically indicated to do so or requested
- Carefully monitor fluid intake all day
- Use over-night, whisk-away incontinent products for incontinent residents
- Encourage time to urinate before bedtime
Incontinence & Repositioning

• Extend periods of uninterrupted sleep at night: (2 → 3, 3 → 4, 4 → 6, 6 → 8)

• Reduce disturbance of sleep at night to toilet, change or reposition the resident

• Assess skin conditions for tolerating longer and longer periods of not being repositioned without causing untoward effects on skin

• Allow sleep without changing incontinent product or toileting AND not resulting in any negative outcomes
Skin Conditions & Repositioning


Repositioning

• When Determining Repositioning Frequency consider the individual’s (NPUAP, 2014):
  • Level of activity and mobility
  • General medical condition
  • Overall treatment objectives
  • Skin condition
  • Comfort
  • Preferences
Activity: Increase Daytime Active Engagement

• Sleep better
• Have less falls
• Have less depression
• Have less agitation

“Active Engagement: Pulls participants out of a passive state, expending energy, providing pleasure and movement opportunities, and reducing other neuropsychiatric symptoms.”

(Buettner, Fitzsimmons & Dudley, 2010)
Diet: Foods, fluids, nutrients – to enhance sleep and wake

• When should we eat more protein?
  – In the morning

• When should we eat more carbohydrates?
  – In the evening

• When should eat sodium?
  – In the morning

• When should eat potassium?
  – In the evening

• Drink caffeine in the morning to early afternoon

• Spicy foods and sugar can disturb sleep
*Foods: May Improve Sleep*

**Snooze Foods:**
- Dairy foods
- Whole grains (carbs)
- Beans, rice
- Turkey, chicken
- Hummus
- Lentils
- Hazelnuts, peanuts
- Sunflower seeds, sesame seeds

**Bedtime Snacks:**
- Apple pie with ice cream
- Whole grain cereal with milk (carbohydrates)
- Oatmeal and raisin cookies with milk
- Peanut butter sandwich
- Bananas (potassium)
- Herbal teas

*Note: May take up to one hour to work.*
Foods That Energize: Wake Up!

• **Breakfast:**
  - Protein: meats, fish, eggs, cheese, yogurt
  - Vitamin C: oranges or orange juice, guavas, strawberries, cantaloupe, kiwifruit
  - Sodium: sausage, bacon
  - Caffeine: coffee, teas, chocolate

• **Mid-afternoon snacks:**
  - Peanut butter spread on whole-wheat bread or on an apple, dried fruit, almonds, cheese, pop corn
Hydration Management

- Bulk fluid intake in the morning, taper down after lunch, least fluids at dinner (8, 6, 4 oz)
- Discourage fluids after the evening meals unless medically indicated to do so or requested
- Carefully monitor fluid intake all day
- Caffeinated liquids encouraged until midafternoon
- No caffeine, alcohol after evening meal
Aromatherapy

• Aroma targets different neuro-chemicals in the limpid system brain, to lift up, stimulate, sedate and/or create euphoria
• Can be used primarily by:
  • inhalation,
  • topically
  • orally (only under medical supervision)

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Aromatherapy: Essential Oils

- Essential oils, with standardized content of components (marked FCC, for Food Chemical Codex) are required to contain a specified amount of certain aroma chemicals that normally occur in the oil
- 1 drop of essential oil on a small round band aid placed on the neck of the person or collar of their nightwear
- Suspending a fine mist of essential oils into the air by a specific amount of oil placed in an electric atomizer
Aromatherapy

• Certain studies involving brain wave frequency indicate that smelling lavender and chamomile increases alpha waves in the head, which are associated with relaxation

• Jasmine and citrus increases beta waves in the front of the head, which are associated with alertness

• Eucalyptus can relieve sinus headaches due to its anti-inflammatory effect

• Peppermint applied topically causes nerves to be less stimulated and pain relieved

• Ginger applied topically relieves nausea.
Implementation: Prevent Disturbances to Sleep

- What are the root causes for the disturbances to sleep? Why are residents not sleeping at night?

- Prioritize:
  - leadership makes it a priority
  - educate staff, residents, families, MDs, surveyors
  - grab the low hanging fruit first
  - do the easier, quicker successes first
  - then take on the greater challenges
Did the Restorative Sleep Vitality Program help to reduce falls even more?
~ Mahatma Gandhi was asked, “How to initiate change.”

“First they ignore you, then they laugh at you, then they attack you, then you win.”
Sleep is the golden chain that ties health and our bodies together.

~ Thomas Dekker

Our nursing home has come to the forefront in recognizing that a good night’s sleep is one of the most important gifts we can give our residents. Sleep is not just a state we fall into, but a necessary and vital part of keeping us healthy.

It is during the deepest stages of our sleep that healing takes place.

Muscles, bones and joints heal and grow; skin and connective tissue regenerate; cells repair; hormones are regulated; daytime learning is retained; stress and inflammation are reduced; and our immunity is strengthened – to name just a few rejuvenative factors occur when we sleep.

*Without these deep stages of sleep, it is harder for us to feel well, to fight off infections or to overcome disease. Interrupting sleep deprives us of all of these things and makes healthy living hard to maintain.

During the dream stages of our sleep we:

- We process our emotions
- Cement new memories
- Relieve stress

*The dream stages of sleep assist us with memory recall. We feel more stressed and more easily confused when we miss out on this vital stage of sleep.

With sleep in mind, we have reviewed our practices and cares and have made adjustments that include:

- Reduce disturbances to nighttime sleep and increase daytime activities for our residents
- Encourage good exposure to light and sun during the day and darkness at night to help keep internal clocks set
- Reduce daytime napping that robs nighttime sleep
- Offer different types, timing and amount of foods and fluid to better enhance wakefulness and sleep
- Review and perhaps change medications to assist with improved sleep and wake times
- We continue to look for ways we can enhance the sleep and wake of our residents – and by doing this we are increasing their quality of life.

We allow our residents the option of not being disturbed during the night, if that is their desire. By eliminating or minimizing night time interruptions, we can encourage more of the restorative sleep they need to maintain and enhance their quality of life. If you would like your loved one to have uninterrupted sleep at night, please discuss this with any nurse. Although there may be times when we need to awaken your loved one (usually for medically necessity) our goal will be to minimize disturbances to nighttime sleep. Your Household and Clinical coordinators can advise you about the risks and benefits of interrupting a resident’s sleep.

We invite you to consider uninterrupted sleep for your loved one as a way of improving their all around well being. This is their home and in an effort to make it feel more like home, helping them get a good night’s sleep is one of our goals.
Empira’s Restorative Sleep Vitality Program – Evidence-Based Resources, Articles, Reports of Practice, Works Studied and Cited (Abridged version 2015)

Circadian Rhythm:


Alessi, CA, and et al. "A randomized trial of a combined physical activity and environmental intervention in nursing home residents." UK Pubmed Central.


Best Practice: Evidence Based Practice Information Sheets for Health Professionals. "Strategies to manage sleep in residents of aged care facilities." 2004: 1-5.

Bloom, Harrison G., MD, Ahmed, Imran, MD, Alessi, Cathy A., MD, Ancoli-Israel, Sonia, PhD, Buysse, Daniel J., MD, Kryger, Meir H., MD, Phillips, Barbara A., MD, Thorpy, Michael J., MD, Vitiello, Michael V., PhD and Zee, Phyllis C., MD, PhD. "Evidence-Based Recommendations for the Assessment and Management of Sleep Disorders in Older Persons." The American Geriatrics Society, 2009: 57:761-789.


Aggression and Violence:


Noise:


Englehardt, Kirk J. Quiet on the Hall: Researchers Search for Ways to Reduce Noise and Improve Sleep in Nursing Homes. Georgia Tech Rearch Institute.

Light:


Buscemi, N, and et al. "Melatonin for Treatment of Sleep Disorders." National Center for Biotechnology Information.


http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2387133/.


Sleep Environment:

Evidence-Based Design Meets Evidence-Based Medicine: The Sound Sleep Study. The Center for Health Design Research Coalition, Harvard Medical School, 2010.


**Napping:**


**Medications:**


**Continence / Repositioning Needs:**


"TENA assists in implementing an Individualized Care program and the results are impactful at the Resident care & operational levels." *TENA Solutions: A Case Study*. 2013.

**Activity/ Inactivity:**


**Diet and Fluids:**


