Objectives

- Restate the key components of the Empira Fall Prevention program
- Explain the process that lead to the Empira Restorative Sleep Vitality Program
- Discuss the etiology of sleep and wake in human beings
- Identify the key components of the Empira Restorative Sleep Vitality Program

Background & Process

- Empira awarded 3-year MN DHS PIPP grant, began 10/1/08
  - A project implementing best practices from evidence based studies
  - Goal: Reduce CMS QI/QMs: Falls, Depression & Anxiety, Decline in LL ADL, Decline in movement
  - Reduction Goal: 5% first year, 15% second year, 20% third year
- 16 SNFs, 4 companies participate in PIPP Fall Prevent project
- Fall Risk Coordinator in each SNF reports to administrator who oversees the program – it's not a nursing program!
- Project completion date: 10/1/11
Results after 2½ years

- Prevalence of Falls (number of residents who have fallen) – decreased by 31% (QI 1.2)
- Incidence of Depression – decreased 20% (QI 2.1)
- Incidence Worsened ADLs – decreased 17% (QI 9.1)
- Incidence Worsened Room Move – decreased 12% (QI 9.3)
- Falls per 1000 resident days (number of falls that occurred) – decreased by 14%
- Recurrent Falls – double digits to single digit

* Compared to a baseline from July 1, 2006 to June 30, 2007

Two Tiered Approach

- Proactive (fall prevention)
  - Speculate on degree of risk for falling
  - Actions based on conjecture
  - Actions based on predictions

- Reactive (post falls action)
  - Investigate current falls as they occur
  - Collect factual evidence from the fall event
  - Collate, aggregate and study the causes of falls

What is root cause analysis?

- RCA is a process to find out what happened, why it happened, and to determine what can be done to prevent it from happening again.
Root Cause Analysis:

- Root cause analysis (RCA) transforms an old culture that reacts to problems, into a new culture that solves problems before they escalate.
- Aiming performance improvement operations at root causes is more effective than merely treating the symptoms of problems.
- Problems are best solved by eliminating and correcting the root causes, as opposed to merely addressing the obvious symptoms with "scatter-gun approaches" to solutions.

3 Areas to Investigate for Root Cause Analysis

1. Internal / Intrinsic conditions
2. Environmental / Extrinsic conditions
3. Operational / Systemic conditions

Why Do RCA After a Fall?

- Q: “It’s a single event and won’t happen that way again?”
- Q: “No one, including that resident, will ever fall that way again?”
- A: If the brakes failed in your car on an icy road, don’t figure out “why” or tell the manufacturer because that accident will never happen that way to you or anyone else again. WRONG!! NOT!
Post Fall RCA:

• Root Cause(s) Analysis:
  • Why did they fall? →
  • What were they doing before they fell? →
  • But, what was different this time? →
  • Where did they fall? →
  • When did they fall? →
  • What was going on when they fell?
  • So, why did they fall? →

Person Centered “at risk” for Falls on Admission

• Mr. SD, 74 y.o., lives alone, recent widowed, alcohol dependent, slightly confused, easily agitated, has multiple hematomas from his many falls
• Mrs. MW, 69 y.o., 297 lbs., newly diagnosed brittle diabetic, not compliant with diet and meds, admitted post-hip pinning after a fall in her home
• Mrs. AT, 76 y.o., active, alert, visually impaired due to macular degeneration, slipped and fell getting out of her son’s car, fx elbow & shoulder
• Mr. BL, 88 y.o., early stage Lewy Body dementia with symptoms increasing, can no longer be cared for in his AL setting

10 Questions at the time a resident falls. Stay with resident, call nurse.
1. Ask resident: Are you ok?
2. Ask resident: What were you trying to do?
3. Ask resident or determine: What was different this time?
4. Position of Resident?
   a. Did they fall near a bed, toilet or chair? How far away?
   b. On their back, front, L side, or R side?
   c. Position of their arms & legs?
5. What was the surrounding area like?
   b. If in bathroom, contents of toilet?
   c. Poor lighting – visibility?
   d. Position of furniture & equipment? Bed height correct?
6. What was the floor like?
   a. Wet floor? Urine on floor? Uneven floor? Shiny floor?
   b. Carpet or tile?
7. What was the resident’s apparel?
   a. Shoes, socks (non-skid?) slippers, bare feet?
   b. Poorly fitting clothes?
8. Was the resident using an assistive device?
   a. Walker, cane, wheelchair, merry walker, other
9. Did the resident have glasses and/or hearing aids on?
10. Who was in the area when the resident fell?
Interventions

- Definition of Medical Interventions: patients receive treatments or actions that have the effect of preventing injury, illness and/or prolonging life.
- Interventions must match the causative agents of the injury, illness, disease and/or conditions.

Hierarchy of Actions and Interventions

- National Center for Patient Safety’s “Hierarchy of Actions”, a classification of corrective actions and interventions:
  - Weak – actions that depend on staff to remember their: training, policies, assignments, regulations, e.g. “remind staff to . . .” or “remind resident to . . .”
  - Intermediate – actions are somewhat dependent on staff remembering to do the right thing, but tools are provided to help the staff remember or to help promote better communication, e.g. lists, pictures, icons, color bands
  - Strong – does not depend on staff to remember to do the right thing. The tools or actions provide very strong controls, e.g. timed light switch, auto lock brakes
- To be most effective: interventions need to move to stronger actions rather than education or memory alone.

Implement Interventions / Solutions

- What will you do to prevent this problem from happening again?
- Do the interventions / solutions match the causes of the problem?
- How will it be implemented? Who will be responsible for what?
- How will the solutions impact or effect other operations / people in your facility?
- What are risks to implementing the solutions?
- Move from weak to strong interventions.
Personal Alarms: definition

Personal alarms are alerting devices designed to emit a loud warning signal when a person moves.

- The most common types of personal alarms are:
  - Pressure sensitive pads placed under the resident while they are sitting on chairs, in wheelchairs or when sleeping in bed
  - A cord attached directly on the person’s clothing with a pull-pin or magnet adhered to the alerting device
  - Pressure sensitive mats on the floor
  - Devices that emit light beams across a bed, chair, doorway
  - Architectural alarms are not an issue

Determine RCA: Why did the alarm go off?
“Because the person was moving.” – No!

- RCA: What does the resident need, that set the alarm off?
- RCA: What was the resident doing just before the alarm went off?

Alarm Reduction & Elimination

- Evidence based studies for the reduction and elimination of alarms to reduce:
  - Falls, depression, skin breakdown, confusion, incontinence, inappropriate behaviors
- Results from alarm elimination
Results of Alarm Reduction
Alarms being used at all times of the day.
CARE CENTER #1: APR - JUNE 2010 FALL TIMES

X axis = times of the day the falls occurred, Y axis = # of falls.

TCU, FALL TIMES, JUNE - NOVEMBER 2010
Beginning to reduce the number of alarms.

X axis = times of the day the falls occurred, Y axis = # of falls.

TEAM 2, Fall Times, January - March 2010
No alarms used during night shift

X axis = times of the day the falls occurred, Y axis = # of falls.
No alarms used during evening and night shifts.

X axis = times of the day the falls occurred, Y axis = # of falls.

Noise level in decibels in an Empira member SNF from 10:52 PM to 6:22 AM.

Alarms Annul Our Attention

After you put something in the oven or microwave or clothes dryer, why do you set an alarm on (or the machine has an alarm) that goes off?
“Alarms Cause Reactionary Rather than Anticipatory Nursing”

“Sit down.” versus “What do you need.”

~ Theresa Laufmann, BSN
DON Oakview Terrace Nursing Home, Freeman, SD

How to Reduce Restraints & Alarms
Multiple procedures & protocols to remove alarms.
Begin by asking staff their preference:

By resident status/ triage:
1. Begin rounding on residents who have fallen
2. No restraints or alarms on any new admission
3. Do not put a restraint or an alarm on any resident who does not currently have one on
4. If resident has not fallen in ____ (30) days
5. If resident has a history of removing restraint or alarm
6. If alarm or restraint appears to scare, agitate, or confuse residents
7. If resident has fallen with an alarm on, do not put it back on

By unit, shift, specific times:
1. Begin rounding on residents who have fallen
2. Start on day shift on 1 nursing/household unit
3. Then go to 2 nursing/household units on day shift
4. Then go to 2 shifts on 1 nursing/household unit
5. Then go to 2 shifts on 2 nursing/household units, etc.

By “Cold Turkey”:
1. “All restraints and/or alarms will be removed by ____ (date.)

Thought: we put restraints and alarms on to prevent falls.
So, when we take them off are we allowing falls?

No! We put restraints and alarms on to prevent movement.
We are taking them off to allow movement.
Case Study: Nursing Home Alarm Elimination Program – It’s Possible to Reduce Falls by Eliminating Resident Alarms
www.masspro.org/NH/casestudies.php

Institutional practices that homes should strive to eliminate:
- Overhead paging (this language has been there since 1990)
- Meals served on trays in dining room
- Institutional signage labeling rooms
- Medication carts
- Widespread use of audible seat and bed alarms
- Mass purchased furniture
- Nursing stations

Most homes can’t eliminate these quickly, this is a goal rather than a regulatory mandate.

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.

Systemic Lessons Learned:
• The operations and management of systems, processes and procedures has the greatest impact and effect on fall reduction
• Rarely is the root cause of a fall only a clinical or environmental condition, it is usually the result of an underlying systemic breakdown

Causation Findings Identified from Fall Prevention Program
• External causes: Noise, busy activity, lack of environment contrasts, placement of furniture, equipment & personal items
• Internal causes: Poor balance, sleep deprivation, orthostatic B/P, medications (type & amt), endurance/strength
• Systemic causes: Time of day, shift change/times, break times, day of week, location of fall, type of fall, routine assignments, staffing levels
Strong Interventions to Prevent Falls

- Root Cause Analysis
- Hourly Rounding – 4Ps
- Reduce Noise:
  - Alarm/Restraint Elimination, Staff talking, TVs
- Reduce Medications
- Provide Opportunities to Balance
- Contrast Environment
- Correct Beds Heights
- Reduce Floor Mats
- Fall Huddle
- Consistent Staffing: Know The Resident

Strong Interventions: Family, Physician, Visitors, Surveyors

- Meet, communicate and educate

Case Study #2:

82 y.o. woman is in early renal failure and goes out of the SNF to dialysis each week. She is alert and oriented and requires an assist of 1 person with her transfers. Her granddaughter is in a soccer tournament and she wants to go out of the facility to attend the game. Her son will take her to the game. After the game, when transferring his mother from her wheelchair back into his pickup truck, she “slips” during the transfer and falls to the ground (after hitting the running board on the side of the pickup truck.) 911 is called, she is taken to the hospital. She has sustained multiple bone fractures in both legs.

Why did she fall?
What would be the appropriate interventions?
Restorative Sleep Vitality Program: Goals

• Undisturbed sleep at night

Restorative Sleep Vitality Program: Goals

• Fully engaged, awake during the day

RSVP: Sleep and Wake Challenges & Interventions

• CMS and LTC providers have never considered sleep as an integral part of the plan of care and services 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 it to you to go to bed when you want?”
Empira's Restorative Sleep Vitality Program

- This program is a combination of nationally recognized evidence-based, sleep deprivation studies and the application of cutting edge practices to enhance residents' sleep.
- Empira is challenging some of the standards of practice and operational procedures for providing care and services in skilled nursing facilities.
- Empira staff and corporate representatives attend national & international sleep conferences and conventions to learn and educate membership.

Background & Process

- Empira awarded 3-year MN DHS PIPP grant, began 10/1/11
  - A project implementing best practices from evidence based studies.
  - Goal: Reduce baseline average for 5 CMS QI/QMs and Vital Research Questions, “Can you get up in the morning when you want?” “Can you go to bed when you want?” “Are you bothered by the noise when you are in your room?” “Are there things to do here that you enjoy?”
  - Reduction Goal: 2.5% baseline yr → 2nd yr; 5% baseline yr → 3rd yr.
- 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 completion date: 10/1/14

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 body.
**Bodily Systems to fall asleep and wake up**

1. Electrical: Eyes, Brain, Nerves, Emotions, Psych
2. Circulatory: Heart, Blood Flow, Hormones, Digestion, Elimination
3. Muscular/Skeletal: Muscles, Tendons, Ligaments, Bones, Skin

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**Circadian Rhythms: are the body’s internal time keepers**

Circadian rhythms:
- cause changes to occur in the body’s electrical, muscular, and circulatory systems that roughly follow a 24-hour cycle
- cause internal reactions in an organism (human, animal, plant, bacteria) to the length of day and the length of night by waking up and falling asleep in response to light and darkness
- set clear patterns of body temperatures, brain wave activity, hormone production, cell regeneration immune functions, digestive activities, healing, growth, emotional reactions and other biological activities.

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**Sleep: Cycles & Stages**

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

- Sleep, its stages, and other characteristics of sleep are assessed by polysomnography testing within a sleep lab.
- Tests that identify the sleep and wake cycles include:
  - 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.

Sleep Data & Measurement

- 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
- Time Spent in Bed
- Bed Time
- Get Up Time
- Night Disruptions – number times sleep disturbed
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 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 aroused 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, T3 & 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.

Human Biological Clock: Ideal 24 Hours

- How does the body sleep & wake?
  1. Electrical: brain, nerves, emotions
     - Light or darkness → enters the eye → to the retina →
     - Travels from the retina → the optic nerves → then
     - Sent into the brain → the suprachiasmatic nucleus (SCN) which is located in the middle of the brain, just above and behind the eye sockets → then
       - Nerve message is sent → 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.

Serotonin secretion begins

20:00

Serotonin secretion stops
(8:00PM)
Hormonal & Biochemical Properties of the Sleep/Wake Cycle

Melatonin = hormone

Serotonin = biochemical, neurotransmitter

Melatonin = Sleep

• Melatonin is a hormone. It is secreted by the pineal endocrine gland, in the center brain, when it is dark
• Melatonin is triggered by darkness.
• Greater & longer the Darkness = more melatonin produced
• Light stops the melatonin production.
• Melatonin: heart rate slows, body temp drops, eyes stop moving, brain waves slow, blood pressure lowers, peristalsis relaxes, muscles relax, cell rate drops, etc.

Serotonin = Wake

• Serotonin is the “happy, feel good” hormone.
• Serotonin is triggered by the presence of bright light.
• Greater & longer the light = more serotonin produced.
• Less light = less serotonin produced.
• Serotonin is a neurotransmitter, a biochemical that sends messages across nerves to other nerves or cells.
• It is found in three places in the human body:
  • gastrointestinal (GI) tract, blood platelets, central nervous system
• Serotonin enhances: wakefulness, appetite, digestion, healing, growth, sleep, and cognitive functions of memory and learning.
• Selective Serotonin Reuptake Inhibitors (SSRIs) including, Prozac, Paxil, and Zoloft, are antidepressants, which stimulate the production of serotonin by collecting and concentrating it into the brain.
BUT

• Serotonin and melatonin can not be easily used (metabolized) by the body without . . .
  tryptophan!

Tryptophan

- Tryptophan is an essential amino acid (protein), which means it is not produced by the body but rather must come strictly from the diet.
- In the absence of tryptophan, serotonin and melatonin can not be easily used by the body. Tryptophan helps the body to utilize melatonin and serotonin.
- Tryptophan helps the body to relax and function smoothly.
- If there is not enough tryptophan in the diet, it can lead to anxiety, depression, scattered thinking and insomnia.
- It is particularly plentiful in eggs, cod, tuna, shellfish, soy, pumpkin seeds, sesame seeds, chickpeas, peanuts, sunflower seeds, chocolate, oats, dried dates, cottage cheese, yogurt, milk, red meat, poultry.

BUT . . .

2. Circulatory: Heart, Blood Flow, Hormones, Digestion, Elimination

Diet = food & fluids
  Its effect on sleep & wake.
Tryptophan

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BUT...

BUT

- Tryptophan can not be easily used by the body with out... calcium and magnesium!

Calcium & Magnesium Needed for Better Sleep

- Calcium rich foods that enhance sleep:
  - Milk, yogurt, cottage cheese, ice cream
  - Figs, raw apricots,
  - Whole wheat breads, cereals

- Magnesium rich foods that enhance sleep:
  - Whole grain cereal, pumpkin seeds, seeds, peanuts, nuts
  - Black beans, spinach
2. Circulatory: Heart, Blood Flow, Hormones, Digestion, Elimination

- Proteins $\rightarrow$ amino acids $\rightarrow$ tryptophan: brain foods, wake up foods
- Carbohydrates $\rightarrow$ sugars: instant energy, then crash, then sluggish, then sleepy
- Fats $\rightarrow$ fatty acids
- Minerals $\rightarrow$ sodium: wake up, $\rightarrow$ potassium: sleep
- Chemicals $\rightarrow$ caffeine, spices

Proteins, Carbohydrates, Fats: Effects on Sleep & Wake

- Proteins: are sometimes called the “building blocks of life” and “brain food.” It repairs tissue, muscles, skin and organs. It provides muscle strength and elasticity. It releases hormones (dopamine) that wake us up. The body needs protein to function, move and grow. Protein provides long slow energy.
- Persons with diets lacking in protein can feel tired, lethargic, sluggish and perform poorly on mental exams and physically challenging activities.
- Foods containing protein: fish, chicken, eggs, meats, soy, tofu.
- Eat more protein in the morning at breakfast.

- Carbohydrates: are either simple or complex. It provides either shorter and instant forms of energy or delayed and longer forms of energy.
- Simple carbs: are the quickest form of energy. When not used for instant energy, simple carbs become stored as fat in the body. Found in: various types of sugar, candies, honey, maple syrup, pop.
- Complex carbs: Provide energy more slowly. Because they are digested more slowly than simple carbs, they are less likely to be stored as fat. Found in: apples, apricots, peaches, oranges, bananas, broccoli, beans, oatmeal, rye, whole grains, wild rice, sweet potatoes, yams.
- Eat more complex carbs later in the day.
Proteins, Carbohydrates, Fats: Effects on Sleep & Wake

- **Fats**: Provide the body with slow stored energy. Fats help the body to use some vitamins, hormones and to breakdown and eliminate foods. Fat also helps to signal the brain that you are full and to stop eating.
- “**Good fats**” or **Unprocessed**: occur naturally in foods such as avocados, olives, salmon, tuna, crab, nuts, seeds.
- “**Bad fats**” or **trans fats**: are from processed, commercially made foods; margarine, cookies, doughnuts, fried foods, potato chips, most snack foods.
- **Unprocessed fats** should be eaten in small amounts throughout the day.

Minerals: Effects on Sleep & Wake

- **Sodium (salt)**:
  - Heart stimulant
  - Increases B/P
  - Holds water: Can cause edema
  - Interrupts sleep
  - Causes jitteriness
  - Have earlier in the day, avoid late in the day
  - **Foods w/ sodium**: cured meats, bouillon, broths, soups, gravies, cheese, snack foods

- **Potassium**:
  - Heart relaxant
  - Decreases B/P
  - Releases water: Can cause dehydration
  - Facilitates sleep
  - Facilitates relaxation
  - Have later in the day
  - **Foods w/ potassium**: bananas, beans, avocados, cantaloupe, eggplant, beets, spinach, dried apricots, figs, raisins, potatoes, squash

Chemicals: Effect on Sleep and Wake

- **Caffeine**:
  - Stimulates nerve ending and increases brain waves
  - Increase alertness and wakefulness
  - Reduce fine motor coordination
  - Disturbs sleep
  - Cause headaches, nervousness and dizziness
  - Increases heartbeat
  - Causes excessive urination

- **Alcohol**: a simple sugar, it initially leads to a more rapid induction of sleep.
  - It increases initial sleep onset but reduces and disturbs REM sleep during the night.
  - Because it is metabolized so quickly, it then becomes a stimulant and causes shallow sleep, multiple awakenings, nightmares and vivid dreams
Spices & Acids

- Avoid hot spicy foods and drinks prior to sleep at night:
  - Causes excessive gastric hyperactivity, bladder irritation, which interrupts sleep
  - Examples: Hot peppers, onion, garlic, curry, tomatoes, cinnamon, ginseng, mustard

- Avoid acidic foods and drinks prior to sleep at night:
  - Causes excessive gastric hyperactivity, which disturbs sleep
  - Examples: Lemon, lime, grapefruit, oranges, cantaloupe, pineapple, honey, watermelon, and cranberries

Timing, Frequency and Amount of Eating & Drinking

- Timing & Frequency:
  - 5 small meals are better than 3 large meals to stay awake during the day
  - Allow 3 – 4 hours after last full meal before falling asleep at night
  - A small snack just prior to sleep at night helps
  - Tapper down fluid intake throughout the day, significantly reduce fluids after evening meal

- Amount:
  - Largest amount of food eaten at breakfast and reduce amount with each meal thereafter
  - Drinking any amount of water during or after a meal actually aids digestion.
  - Water and other liquids help break down food so that the body can absorb the nutrients.

*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 charge at night.
Anabolism and Catabolism

- The building up (anabolism) and breaking down (catabolism) of bodily cells is key to maintaining the sleep/wake balance.
- Ideally, the body should be physically, mentally, emotionally exhausted (catabolism) by day’s end and open to being recharged or revitalized (anabolism) during night’s sleep.

Is there a detriment to sleeping too long?
Can too much sleep be a bad thing?

The human body has evolved to function optimally in the upright position for around 16 hours a day. The average adult will sleep eight to nine hours a day, usually in a supine position. Consistently sleeping for more than nine hours or fewer than eight hours a day has a negative impact on physiological, psychological and cognitive functions (Van Dongen et al., 2003).

- Dehydration
- Progressive cardiac de-conditioning
- Postural hypotension
- Reduced lung function
- Increased susceptibility to respiratory infection
- Urinary retention
- Increased risk of urinary tract infections
- Venous stasis and blood vessel damage
- Osteoporosis
- Increased anxiety, confusion and depression
- Impaired memory function
- Progressive slowing down of metabolic rate
- Reduction in insulin sensitivity
- Gastro reflux and constipation
- Loss of muscle strength and endurance
- Increased susceptibility to respiratory infection
- Decreased skin integrity
Findings to Date:

*Average time in bed at night for sampled NH residents thus far:
- 20% 9 – 10 hours
- 41% 10 – 12 hours
- 19% Over 12 hours

- 27% Disturbed 3 – 4 times nightly
- 10% Disturbed 5 – 6 times nightly
- 9% Disturbed greater than 6 times nightly

*Quarter data ending December 2012

Monitoring & Audits Tools for Sleep – drove decisions & interventions

- Time in bed during nighttime sleep
- Napping – number & length of time
- Turning & repositioning of residents during nighttime sleep
- Facility operational functions during nighttime sleep – cleaning, restocking, supplies, vital signs, maintenance
- Noise levels
- Light levels

Top Disturbances to Sleep*

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

*Circadian Rhythm

Noise Disturbance
Scientific Research Findings:
high arousal studies

1. **Electronic sounds**: phones, alarms, tv
2. **Staff conversations & voice paging**: selectivity to person’s name and conversation content
3. **Exterior noises**: road traffic, jets, helicopters
4. **Interior noises**:
   - **Intermittent**: towel dispenser, ice maker, toilet flushing, door closing, latches, drawers
   - **Continuous**: vital sign monitor, fan, heater

Sound Measurement

- **Decibels**: is the volume of the sound; how loud or soft it is. It is a scale used in acoustics to give an indication of magnitude; for example, 10 decibels is quiet and 100 decibels is loud.

Decibel level examples:
- 130 – 140 decibels: Jet plane taking off, Fireworks exploding
- 90 – 100 decibels: Lawnmower & motorcycle starting
- 45 – 60 decibels: Normal conversation
- 10 – 20 decibels: Whisper
Noise: Goals

- Elimination of all personal alarms
- Elimination of all overhead paging
- Use Silent Pill Crushers: i.e., Silent Knight Pill Crusher by Medline
- Shift change reports in private/closed areas
- Public access TVs reduced and turned off when not actively being watched
- Increase private TV use
- Use Wireless Stereo Headphones: i.e., Rocketfish Over-the-Ear 2.4 GHz Digital Wireless Stereo Headphones

Light & Color: It’s Effect on Sleep & Wake

Light & Color: how we see

- Light sets the body’s internal clock to a 24-hour cycle; it sets the circadian rhythm
- Light, when it enters the eye, hits the retina, suppresses the production of melatonin and increases the release of serotonin
- The color of the light also effects different biological activities
### Altering Circadian Rhythm with Light & Color

- We need 30 minutes of direct sunlight each day to set our circadian rhythm.
- Or 60 minutes of indirect sunlight.
- Or 120 minutes of filtered 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. 

### Color Measurements

- We perceive color depending upon the wavelength of each color. Our eyes are sensitive to the color of light in a very small region of the electromagnetic spectrum.
- The human eye is not capable of “seeing” color radiation with wavelengths outside the visible spectrum.
- Ultraviolet radiation has a shorter wavelength than the visible violet light. Infrared radiation has a longer wavelength than visible red light.
- The visible colors from longest to shortest wavelengths are: red, orange, yellow, green, blue, violet.

White light is a mixture of all the colors of the visible spectrum. Black is a total absence of light.
Color Illumination: Research Findings

- “The use of color illumination is more important than the reduction of brightness to induce rest.”
- “Subjective drowsiness results also indicate that 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 that the more rapid wave length of blue light can delay the onset of sleep because it suppresses the production of 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
- Low color temperature illumination (red, amber, yellow) would be more effective in a bedroom or a similar environment where it is desirable to lower physiological and mental 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

Benefits of Natural Sunlight

- Health benefits derived from just 10 – 30 minutes of direct exposure of sunlight are:
  - Strengthening of cardiovascular system
  - Normalizing blood pressure as well as blood sugar
  - Increasing metabolism
  - Aiding in weight loss
  - Ensuring proper functioning of kidneys by eliminating wastes
  - Enhancing liver function
  - Improving digestion
  - Preventing anxiety and depression

Lighting: Goals

- Automatic timers/dimmers: set to go on and off at specific times
- White/blue spectrum, higher intensity level, lighting during the day time
- Amber/red spectrum lights, lower intensity level, lighting at night
- Pathway motion detector lights at night
- Huglights by NOC staff
- Amber flashlights, lighted visor caps
Lighting Products

- Hug Lights: Target, Wal-Mart
- Amber fluorescent tube covers: www.lightingplastics.com
- Amber Gel Sheets: Crescent Moon Products, (Medium Bastard Amber) Item # UG-004, www.Sales@crescentmoonprod.com
- Amber Flashlights: hunter’s flashlights at sporting goods stores

Nappings’ Disturbances to Nighttime Sleep

More than one 30 - 40 minute nap robs nighttime sleep; primarily at Stage 3 and REM Stages of sleep!

Medications:

- Do not awaken sleeping resident at night to administer medications
- Identify which medications support sleep and which medications disturb sleep
- Non-specific medication times, i.e. “medications upon rising,” “prior to bed at night”
- Identify optimum metabolism times of medications
Pain

- RCA: source and reason for pain
- Alternative comfort and pain relieving interventions other than medications
- Medicate to facilitate pain relief AND sleep
- Consider long acting pain medication to cover throughout nighttime sleep
- Schedule routine rather than PRN meds

Incontinence & Repositioning

- Extend periods of uninterrupted sleep at night
- Reduce disturbance of sleep at night to toilet, change or reposition
- Assess skin conditions for tolerating longer periods of not being repositioned without causing untoward effects on skin
- Allow to sleep without changing extended wear incontinent product or toileting AND not resulting in negative outcomes
- See Handout: “Let Them Sleep . Sleep Decision Tree”

Diet and Fluids

- High protein in AM, low protein in PM
- Low carbohydrate in AM, high carbs in PM
- Higher calorie meals in AM than in PM
- Higher fluid intake in AM with decreasing fluid intake as day progresses
- Gentle restriction of fluids after PM meal
- Educating on smart food choices to enhance wakefulness and sleep
Weight Gain / Weight Loss

<table>
<thead>
<tr>
<th>Gain caused by:</th>
<th>Loss caused by:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Sleep deprivation causes an imbalance in the following hormones:</td>
<td>• Sleep deprivation causes an imbalance in the following hormones:</td>
</tr>
<tr>
<td>• Orexin – appetite stimulant, high levels</td>
<td>• Orexin – appetite stimulant, low levels</td>
</tr>
<tr>
<td>• Leptin – appetite suppressant, low levels</td>
<td>• Leptin – appetite suppressant, high levels</td>
</tr>
<tr>
<td>• Lacks Stage 3 sleep to totally lower metabolic rate – brain interprets this</td>
<td>• Continuous Stage 1 &amp; 2 sleep keeps body’s metabolic rate high burning off</td>
</tr>
<tr>
<td>continuous metabolic activity as a need for more food</td>
<td>calories and weight</td>
</tr>
</tbody>
</table>

Active & Engaged

- Fully engaged and awake during the day
- Offer activities in lieu of naps and early bedtimes
- Develop and offer activities appropriate to cognitive level of residents
- Develop and offer activities specific to residents’ preferences
- Quality of programs versus quantity of programs

Engaged (active) Residents

- 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)
Sharing & Caring Program

Facility Managers and Leaders: Once a month every SNF leader shares their talents to improve the care of the residents. They provide meaningful engagement 6 – 8 p.m. daily to delay bedtime, so residents go to bed later and do not awaken as often. Promotes restorative sleep, budget neutral managers experience evening shift, build relationships with staff, residents and visitors.

Measurement & Assessment Tools

- Actiwatch
- Sound Meters
- Light Meters
- WellAWARE

What is Actigraphy?

- Objective, monitoring method for tracking a patient’s sleep/wake activity patterns over 24 hours
- Measures amount and type of light resident is exposed to
- Recording of motor activity:
  - Motor activity during sleep periods is an indicator of wakefulness
  - Motor activity during wake periods is an indicator of daily living
- Provides sleep schedule variability, sleep quantity and quality statistics, and daytime activity patterns
- Can better identify therapeutic options and understand responses to treatment for residents
Fall Prevention & Sleep Disturbance
Idaho Department of Health and Welfare

August 19, 2013
Empira, Inc.

THIS IS A TOOL THAT MONITORS SLEEP
IT IS WORN ON THE WRIST OF THE RESIDENT AND IS
USED AS PART OF OUR SLEEP STUDY
IT MEASURES LIGHT, KEEP IT UNCOVERED FROM
CLOTHING SLEEVES, SWEATERS AND BLANKETS
DO NOT REMOVE IT IS TO BE WORN 24 HOURS FOR 5 DAYS
DO NOT IMMERSE IN WATER DURING BATH
WEARING DURING A SHOWER OR HANDWASHING IS OK

IF YOU FIND THIS DEVICE PLEASE RETURN TO THE
ADMINISTRATOR IMMEDIATELY

Legend:
- Activity
- White Light
- Red Light
- Green Light
- Blue Light
- Red
- Sleep
- Excluded
- Custom
- Sleep/Wake
- Left Wrist
- Marker

Sleep Cycle

Minor rest

Major rest (sleep)

Minor rest

Monday 07/30/2013
(DAY 1)

12:00 PM
0:00 AM
12:00 AM
0:00 AM
12:00 AM

4 day Actigram results

Allowed to sleep until 10: a.m.
## Audit Findings to Date:

- TALT
- Bed Time
- Onset Latency
- Prevalence of Naps
- Get Up Time
- Sleep Efficiency
- Night Disruptions
- Time in Bed
- WASO

See handout: RSVP Jan-Mar 2013
Actigraphy Summary

## Recent Sleep Deprivation and Sleep Disruption Research Findings:

- 2013, Sleep Conference, Baltimore, MD