

FATIGUE, SHIFT WORK, ON CALL

IMPROVING THE SLEEP AND FATIGUE OF APEX MEMBERS

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Outline

- Legal requirements
 - Definition of fatigue
- New Science
 - Functions of sleep
 - Sleep restriction and recovery
 - Sleep loss and health
 - Shift work and health
- New fatigue management approaches
 - Managing fatigue versus managing risk
 - Fatigue Risk Management Systems (FRMS)
- Personal strategies

Health and Safety at Work Act (2015)

- Mental and physical fatigue can cause hazards
 - ▣ Hazard - 'a person's behaviour where that behaviour has the potential to cause death, injury, or illness to a person'
- Worksafe guidance, shift work is a cause of fatigue
 - ▣ 'Managing shift work to minimise workplace fatigue'



Shift work causes fatigue, fatigue contributes to hazards

Workplace health and safety is a shared responsibility of officers, PCBUs and workers

Definitions

- **Fatigue is:**
a physiological state of reduced mental or physical performance capability resulting from sleep loss or extended wakefulness, circadian phase, or workload (mental and/or physical activity)
that can impair a person's alertness and ability to work safely and efficiently
(from ICAO 2011)
- **Fatigue is:**
Not enough sleep to recover from energy expenditure (mental, physical emotional) of all waking activities (not just work)
- **Shift work is:**
any work pattern that requires you to be awake when you would normally be asleep if you were free to choose your own schedule

Need to reintegrate our understanding of sleep and wake

Why sleep?

- Brain needs to go 'off-line' for essential recovery and maintenance
 - ▣ Ignores (mostly) inputs from the senses
 - ▣ complex series of processes
 - dreaming (REM) and non-dreaming (non-REM)
 - memory consolidation, learning
 - emotional regulation
 - repair of tissue wear-and-tear
 - growth
 - recharge immune system
 - regulate appetite, metabolism ...
 - ▣ wake up as an updated version of yourself!

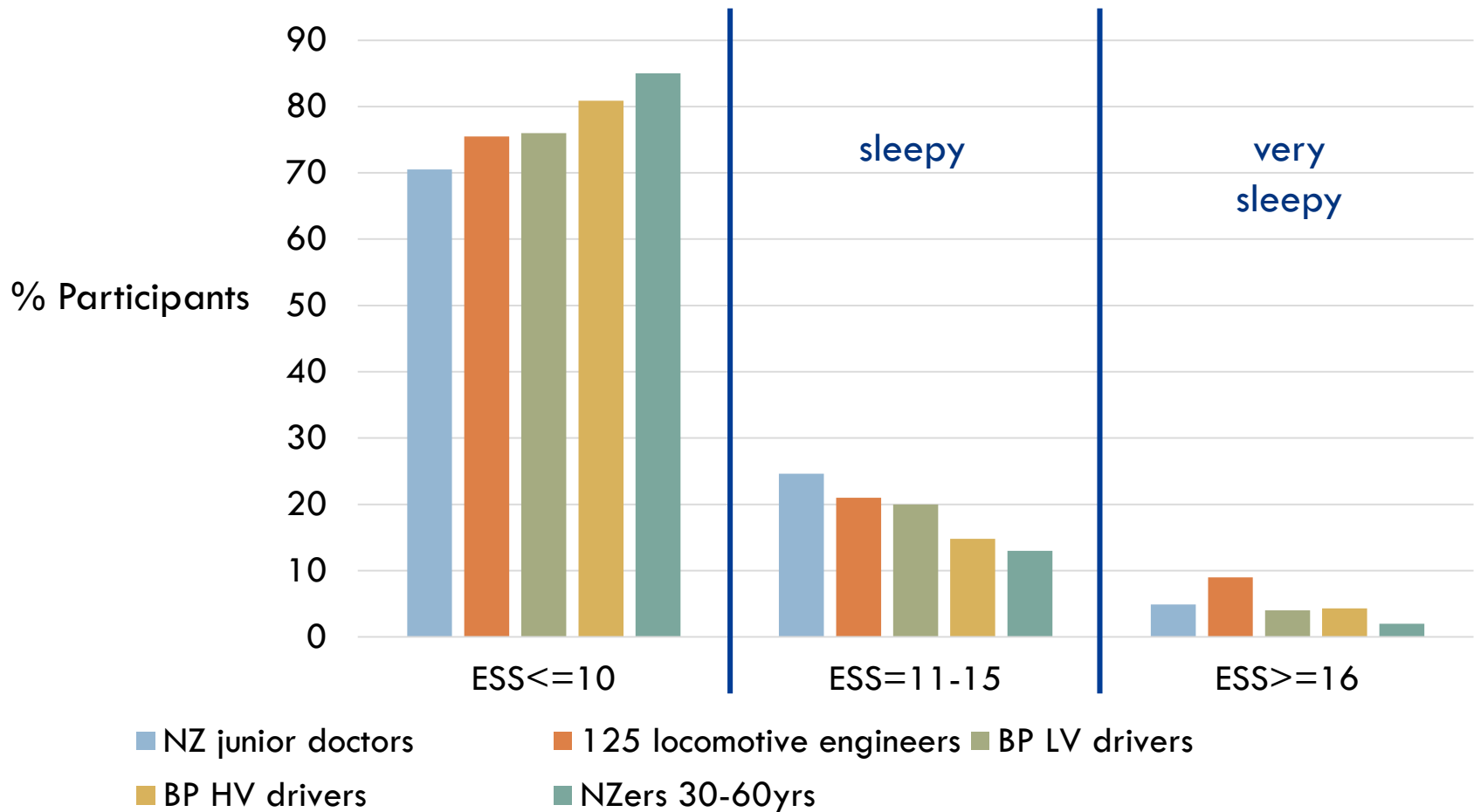


Not enough sleep

- Restricted sleep leads to:
 - feeling sleepier, irritability, degraded alertness, slower reaction times, poorer coordination, slower thinking, loss of situation awareness, less creative problem-solving
 - effects are cumulative and dose-dependent
 - uncontrolled sleep
 - sleepiness → microsleeps → established sleep
- Recovering from restricted sleep
 - recovery is not hour-for-hour:
 - sleep usually gets back to normal after 2 nights of unrestricted sleep
 - **not 48 hours off**
 - recovery of waking function can take more than 2 full nights of sleep
- Pressure for sleep builds up across time awake

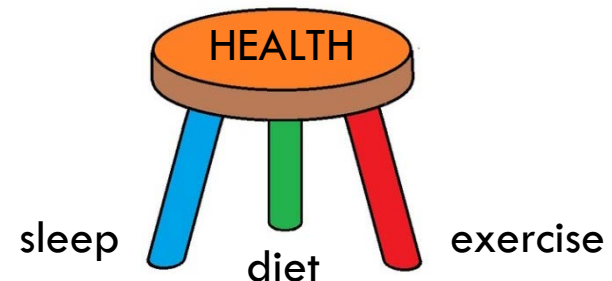


Who is sleepy?



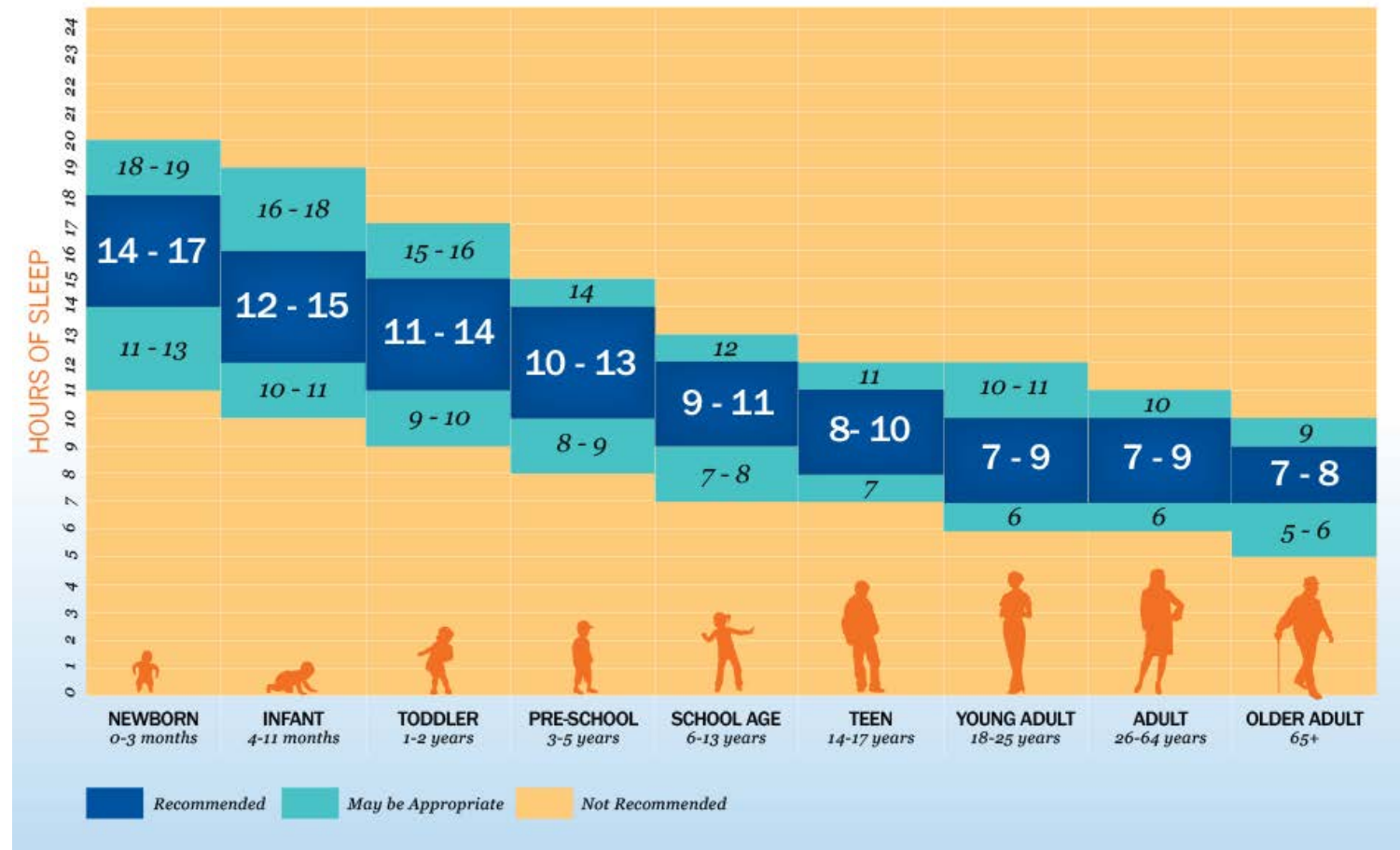
Sleep and health

- Population-based studies - usual sleep < 7 hours increases risk of:
 - obesity, impaired glucose tolerance, type 2 diabetes, cardiovascular disease, poor general health and premature mortality
 - 30.1% of Māori and 24.4% of non-Māori reported usual sleep <7 hrs (30-59 yrs, structured random sample, n=6,799).
- Experimental sleep restriction studies – potential mechanisms
 - increased caloric intake, decreased physical activity and/or altered thermoregulation, impaired glucose metabolism, increases in blood pressure, sympathetic nervous system activity, and inflammatory markers of cardiovascular risk
- Shift work restricts sleep



Recommended sleep

(US National Sleep Foundation Consensus 2015)





Why do we sleep at night?

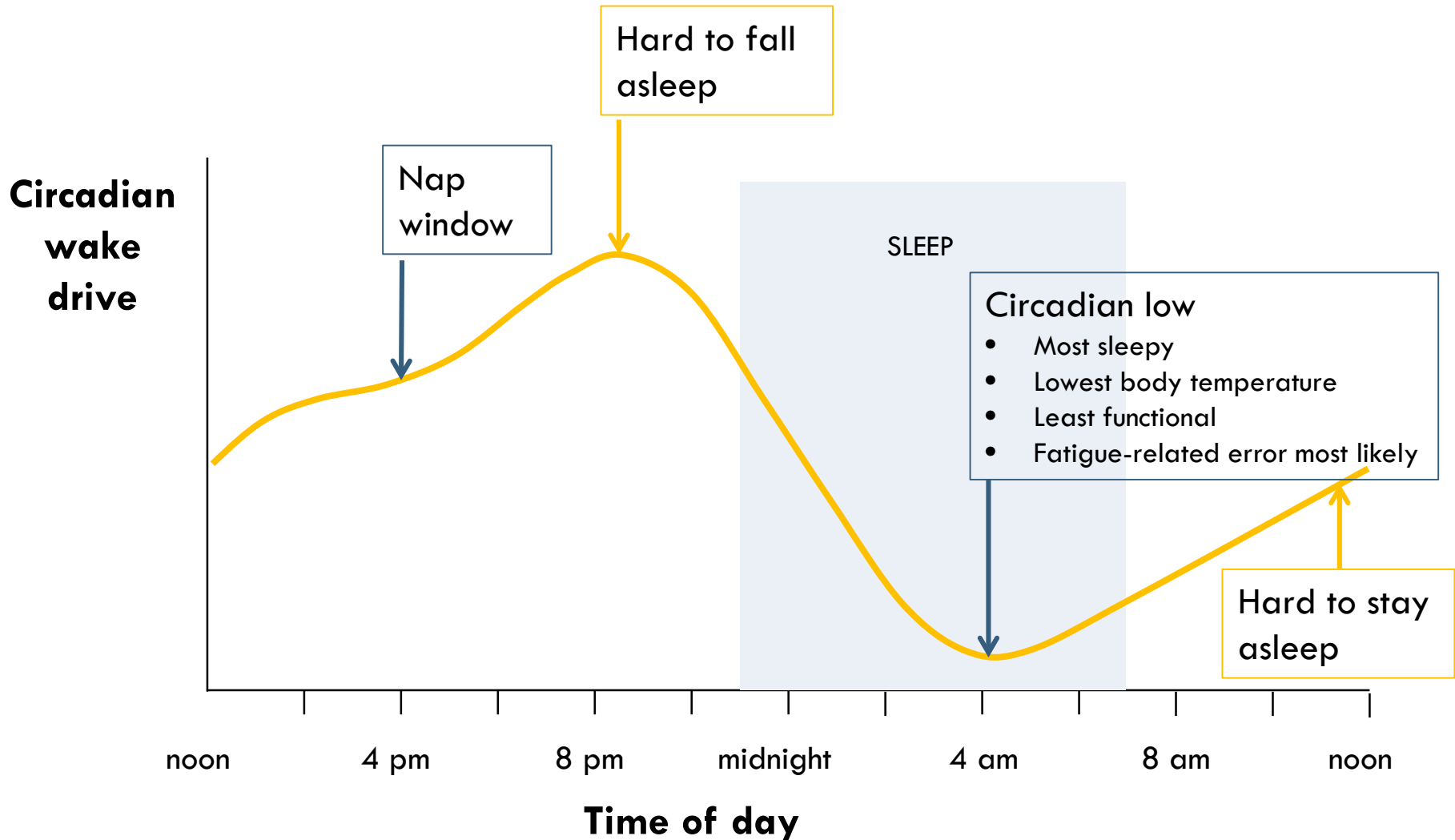
Circadian body clock

- Master pacemaker in the hypothalamus (SCN) that drives daily cycles (circadian rhythms) in
 - How you function
 - body functions - hormones, heart rate, digestion ...
 - ability to do physical and mental work
 - How you feel
 - mood, sleepiness, fatigue ...
- Tracks light intensity even through closed eye lids
 - designed to keep us in step with the day/night cycle
 - connected to sleep-promoting centres and wake-promoting centres in the brain

*2017 Nobel Prize for Physiology or Medicine
Jeffrey Hall, Michael Rosbash, Michael Young
genetic mechanism of circadian rhythms in cells*



Circadian rhythm basics



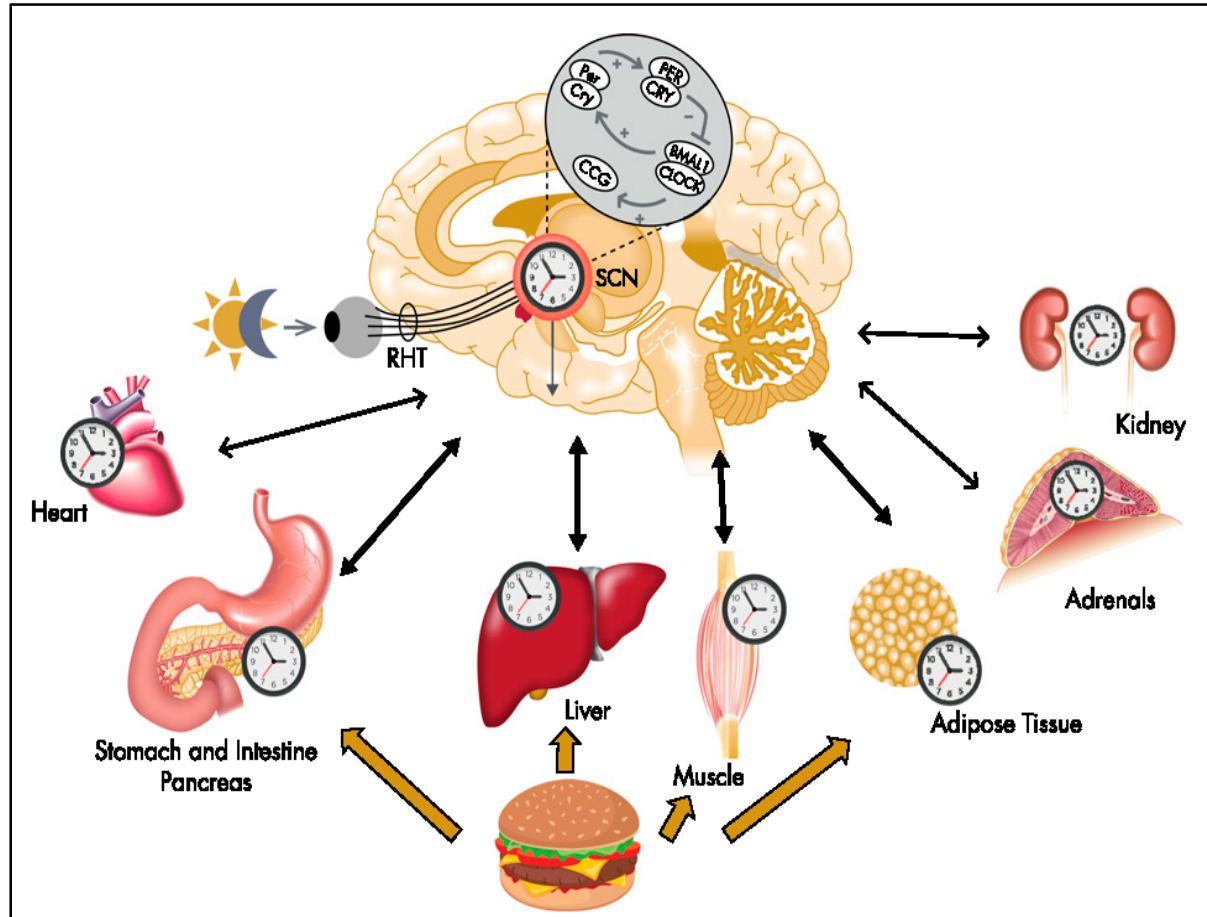
Social time versus biological time

Light sensitive circadian body clock
doesn't adapt to shift work



- Trying to work when least functional
- Eating at physiologically inappropriate times
- Trying to sleep when primed for wake
 - ▣ other time demands, noise, light, heat ...

Circadian desynchrony and health



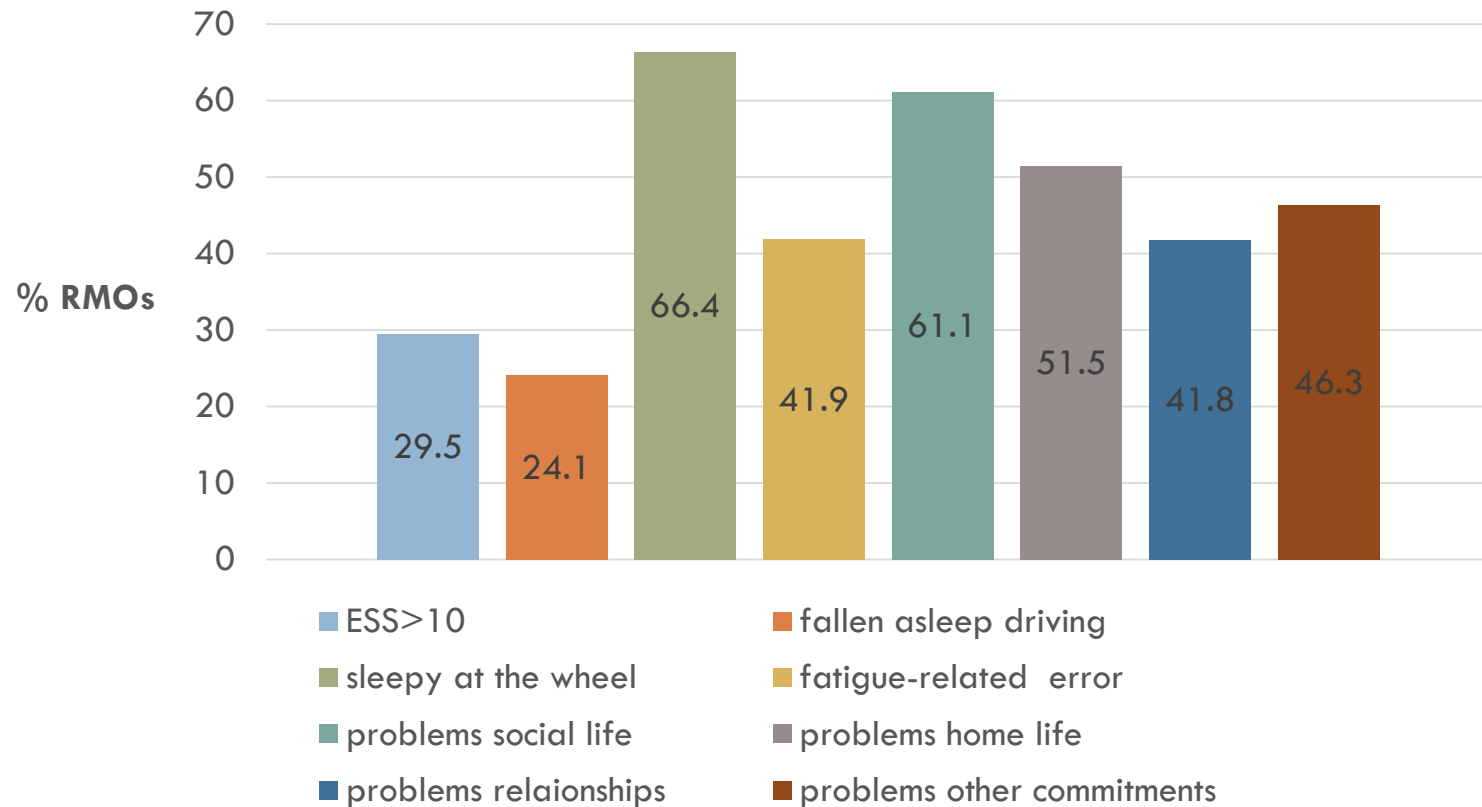
Shift workers greater risk for

- metabolic syndrome, obesity, type 2 diabetes
- cardiovascular disease
- Breast, ovarian, prostate, colorectal cancer, non-Hodgkins lymphoma
- all cause mortality

Denmark compensates breast cancer as an occupational illness

- 20+ years night work, no other major risk factors

Shift work affects life outside work





A New Approach for Managing Fatigue and Shift Work

Fatigue versus safety risk

- Risk depends on
 - ▣ What a fatigued person is doing
 - ▣ Other hazards present
 - ▣ Safety defences present



- William Rockefeller, 46, told investigators that he 'zoned out' moments before derailment which killed 4 people and left dozens injured.
- Metro-North commuter train from Poughkeepsie to New York City was traveling at 82mph as it entered a 30mph curve



- Airline pilot in 4-pilot crew
- In-flight sleep in crew bunk
- Mid-cruise versus landing

Managing fatigue risk

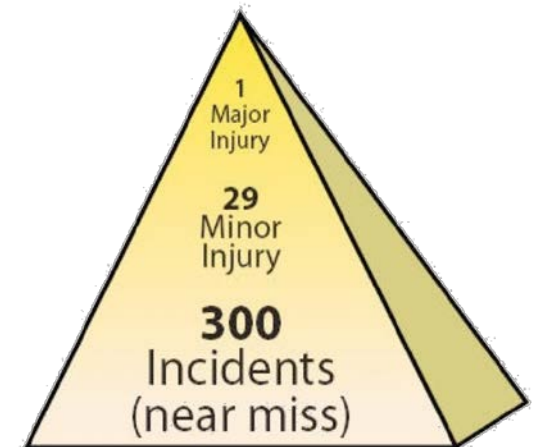
- Traditional approach – limits on:
 - Maximum work hours
 - Minimum breaks within and between shifts
 - Frequency of 24-h breaks
 - Regulatory or by industrial contract
 - Most don't address circadian variation
 - One-size-fits-all
 - Don't address risk

- new approach – data-driven fatigue risk management systems (FRMS) based on:
 - New science and workplace and organisational expertise
 - Shared responsibility
 - Effective safety reporting culture
 - Ongoing monitoring and management of actual risk
 - Multiple strategies to reduce risk



FRMS principles

- Fatigue is inevitable in 24/7 operations
 - cannot be eliminated, must be managed
- Shared responsibility
 - HSAW
 - activities outside work contribute
- Effective safety reporting culture
 - human error is normal and exacerbated by fatigue
 - safety matter
 - intentional violation
 - disciplinary matter
- HSAW requires
 - all staff to report hazards
 - worker engagement in FRMS processes
 - Part 3, s 60



Culture change

FRMS

5 elements + FSAG

1. FRMS Policy

- Identifies FRMS elements
- Identifies FRMS operations (scope)
- Reflects shared responsibility
- States safety objectives
- Declares management commitment
- Identifies lines of accountability

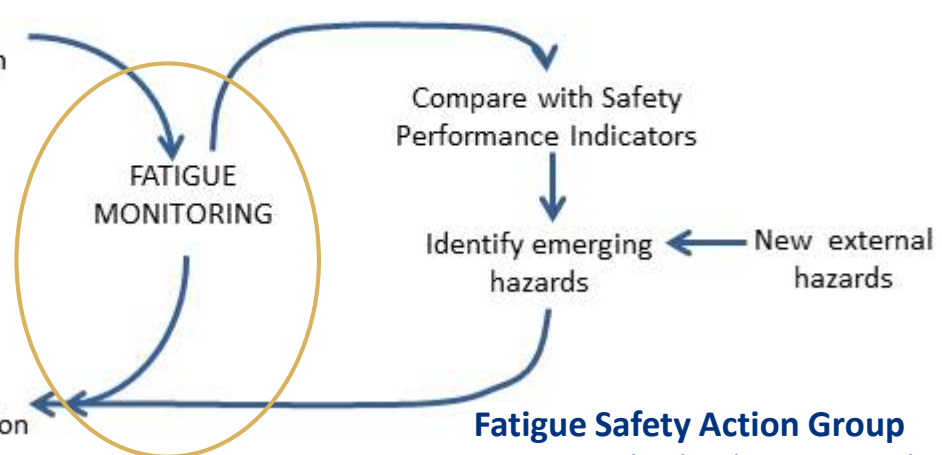
5. Documentation

- Policy and objectives
- Processes and procedures
- Accountabilities, responsibilities and authorities
- Mechanism for involvement of all stakeholders
- FRMS training records
- Planned and actual times worked
- Outputs (findings, recommendations, actions)

2. FRM Processes



3. Safety Assurance Processes



Shared Data

4. Promotion Processes

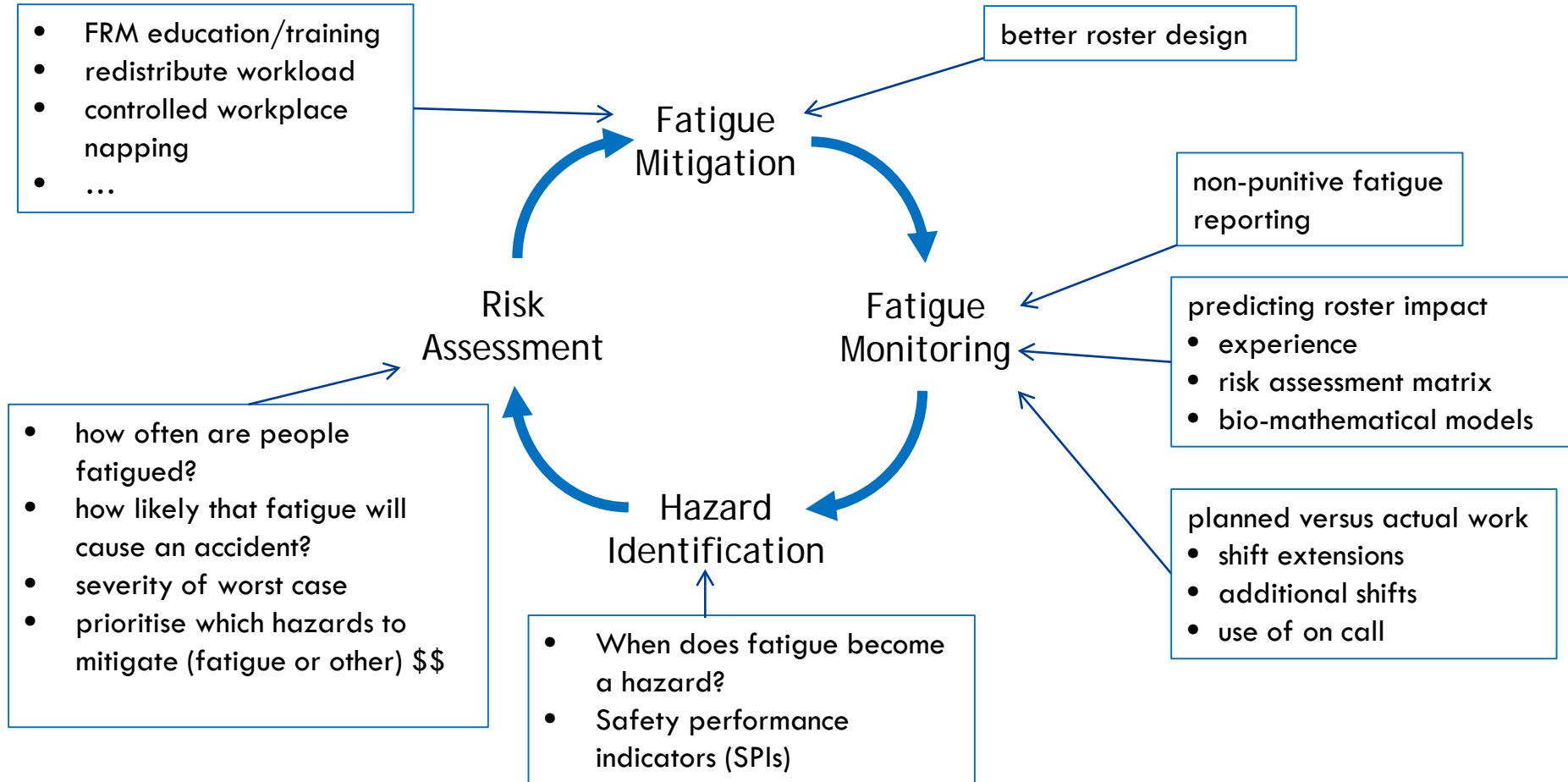
- Training program
- Communication plan

Fatigue Safety Action Group

- oversee the development, implementation of the FRMS
- oversee the ongoing operation of the FRM processes
- contribute as appropriate to the FRMS safety assurance processes
- maintain the FRMS documentation
- be responsible for ongoing FRMS training and promotion



Fatigue Risk Management (FRM) processes



processes required by the Health and Safety at Work Act

Hazard identification

- How does this happen in your workplace?
 - ▣ What data?
 - ▣ Who analyses it?
- Safety Performance Indicators (SPIs)
 - ▣ Agreed standards that help define when a fatigue measure indicates a potential hazard
 - ▣ How much is too much?

Risk assessment

- Frequency x severity
 - ▣ How to assess fatigue risk
- Who is responsible for risk assessment?
- Who prioritises where \$\$ will be spent on risk mitigation?
 - Fatigue versus other risks

Fatigue mitigations

- Better roster design
 - who designs rosters?
 - Is fatigue risk estimated?
- Policies for
 - calling in fatigued (how, consequences)
 - workplace napping (when, where, how)
 - managing staff with chronic sleep problems
- Availability of healthy food, beverages
- Reduce workload
 - Improve skill level
 - More staff
- Healthy workforce (exercise, diet, sleep)
- ...

Mitigations: roster change

- The perfect roster is permanent day work with unrestricted sleep at night
- Better roster design
 - adequate sleep opportunities
 - how fast is sleep debt building up?
 - how long since 2 full nights of sleep in a row?
 - limits on continuous work (time awake, time-on-task fatigue)
 - shift length
 - breaks during shifts (workplace naps?)
 - predictable rosters, plan for covering on-call or call back
 - knowing ahead of time helps people to arrive at work better-rested
 - fair distribution of weekends off
 - work/life balance matters

Summary: managing fatigue

- Duty/rest limits are not enough
- Managing fatigue requires
 - Collaboration: management, unions, staff
 - whole-of-life issues
 - regulatory requirement
 - fatigue is inevitable in 24/7 operations
 - Shared knowledge base
 - education/training on causes of fatigue, management strategies
 - clear communication, policies, and procedures
 - Pooling scientific/workplace/organisational expertise to come up with better solutions
 - Integration with management of other hazards
- Tools and templates are available for FRMS
 - Policies, FSAG terms of reference, risk assessment methods, accident investigation method,



How could this work for APEX Members?

Improving your sleep



Prioritise sleep time

- Sleep when you feel sleepy (if you can)
 - ▣ If you ignore sleepiness, in the end you will fall asleep uncontrollably

TO DO LiST

1. **SO**
2. **MANY**
3. **THINGS**



- At least two full nights in a row of good sleep are needed for recovery from a sleep debt
- Naps are efficient time use
 - ▣ improve your functioning even if you don't feel great.
 - Short naps, less than 40 minutes
 - Longer naps, 2-4 hours

Good sleep habits

- Try to keep a regular sleep pattern: protect time for sleep
- Have a regular pre-sleep routine
- Keep the bedroom a “safe sleep” zone
 - avoid work, worry, exercise ...
- Avoid eating or drinking too much before bed
 - if hungry have a light snack
- Avoid alcohol, caffeine and cigarettes before bed
 - get your blood alcohol to zero before bedtime (you process roughly one standard drink per hour)
 - Caffeine takes effect in 15-45 minutes, effects usually last 3-8 hours
- Learn a relaxation technique to help you to fall asleep
- If you don't fall asleep in 20 minutes
 - get out of bed and do something relaxing

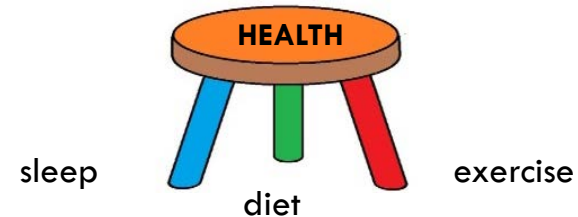


Sleep environment

- dark room
 - ▣ use mask or heavy curtains
 - ▣ avoid hand-held devices (cell phones, i-pads ...) with high blue light screens



- quiet room
 - ▣ turn off the phone
 - ▣ use ear plugs
- comfortable temperature
- comfortable surface





Key points: personal strategies

- Always focus on getting the best sleep you can
- When you have a sleep debt, you tend to over-estimate how well you are functioning
- A balanced diet, regular exercise, and regular good sleep are the 3 pillars of health
- Get blood alcohol to zero before sleep
- If you use caffeine, use it strategically
- If you have a chronic sleep problem, talk to you doctor

Questions?

