

Work hours and the management of fatigue

Dr. Philip Tucker

Department of Psychology



The Stress Response & Evolution



- An ancient programme for survival
- Fight or flight reactions
- Not adapted for today's society

Work related Stress & Health

DEMANDS

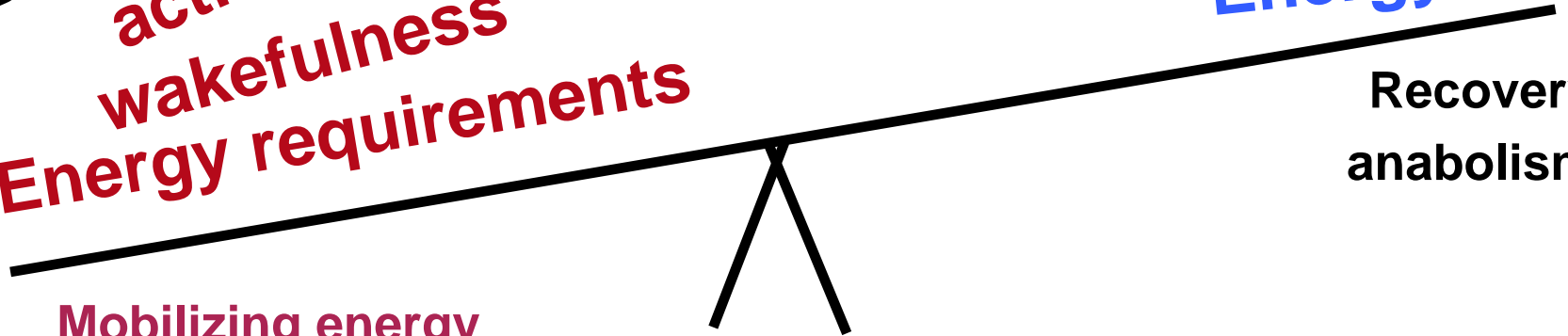
activity
wakefulness
Energy requirements

Mobilizing energy
catabolism

Resources

rest
sleep
Energy intake

Recovery
anabolism



Work related Stress & Health

DEMANDS

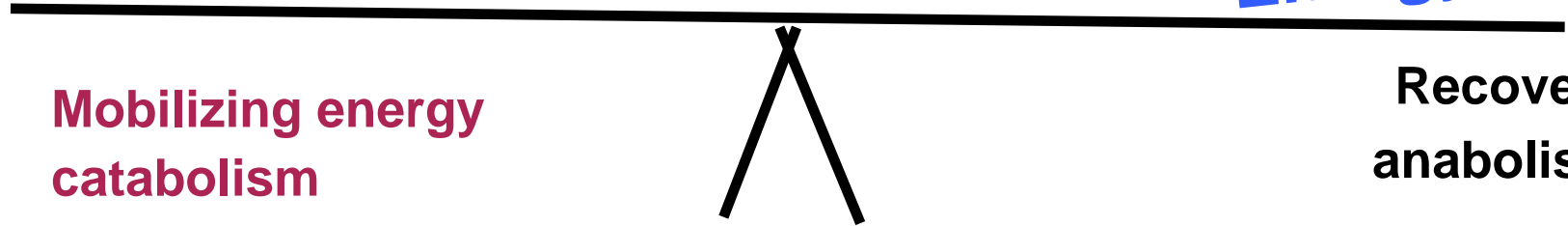
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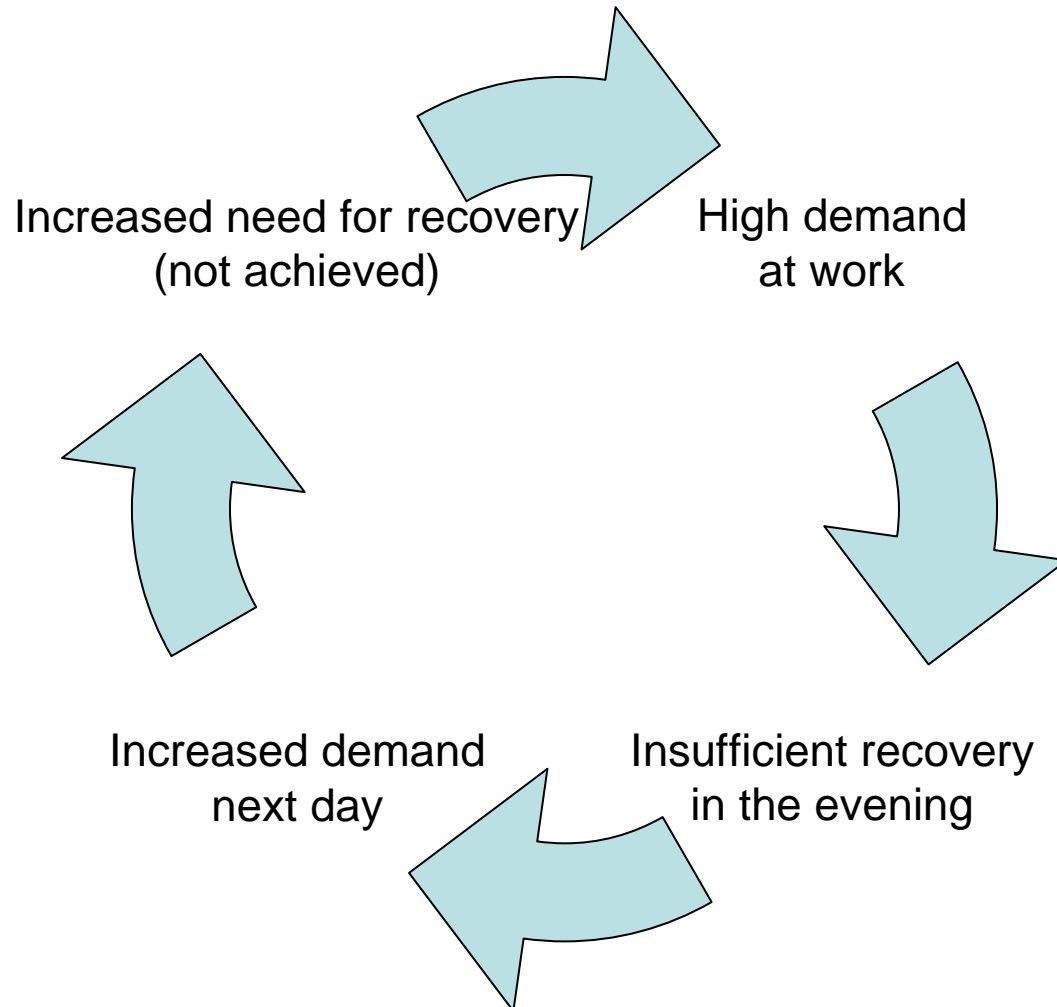
rest
sleep
Energy intake

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Long work hours impede recovery



Long work hours and health



- Long work hours linked to:
 - Cardio-vascular disease
 - Depression
 - Musculoskeletal complaints
 - Physical strain
 - Fatigue
 - ? Mortality
 - ? Work disability
 - ? Physiological indices (Heart rate variability, cholesterol, immunoglobulin, T helper and T suppressor cells)

Impact of long work hours depends on:

- Job rewards
- Physical demands
- Environmental conditions
- Age
- Lifestyle factors (e.g. smoking, exercise)
- Personality
- Social support
- Freedom to choose vs pressure / compulsion
- Control over work hours
- Rest breaks



Long work hours may be particularly harmful when:



- Work hours are very long
 - e.g. > 48 hours
- There is an element of compulsion
- Work conditions are inherently poor
- Compounded by individuals' circumstances
- Insufficient opportunities for recovery

Work rotas & safety

- European Working Time Directive
 - Maximum 48 hours per week,
averaged over 17 weeks
- Rota design should:
 - Minimise the build up of fatigue
 - Maximise the dissipation of fatigue
 - Minimise the disruption of sleep



Shiftworkers' problems:



- Impaired physical health
- Impaired psychological health
- Impoverished family / social life
- Fatigue
 - Disturbed sleep
 - Sustained effort
- Increased risk of mistakes & accidents

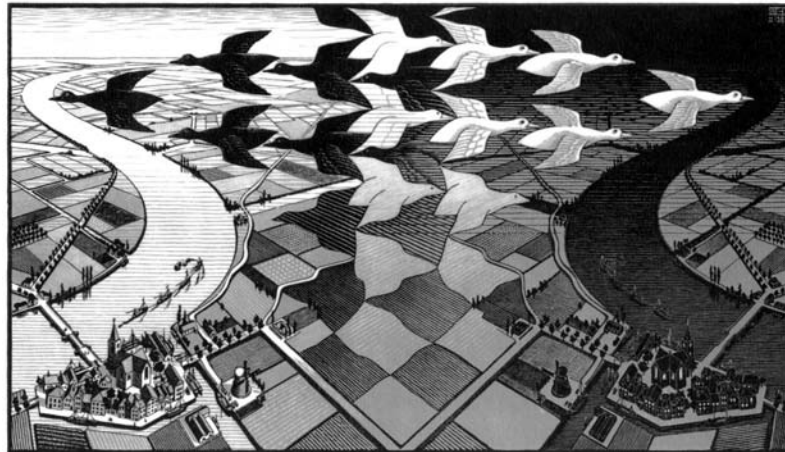
So why can shiftwork cause problems?

- Evolved on a rhythmic planet
- Early organisms simply responded to changes
- Advantageous to anticipate changes
- Most species evolved an internal “body clock”
- Reflected in human “circadian rhythms”



Homo Sapiens is a diurnal species

- We habitually sleep at night!
- Our night vision is poor despite vision being our dominant sense!
- Asking someone to ignore their diurnal nature is a bit like asking them to become aquatic!



Shiftworkers' sleep problems may include:

- Problems falling asleep after night shifts.
- Shortened sleep between successive night shifts (by 2-3 hours).
- Disturbed sleep between night shifts.
 - &
- Truncated sleep before early/morning shifts.
- Disturbed sleep before early/morning shifts.



Shiftworkers' sleep problems affect:

Fatigue & performance

- Feeling tired and/or nodding-off
- Reduced productivity and/or quality
- Increased mistakes, injuries and accidents



How can we minimise shiftwork problems?



1. Educate individuals regarding problems and coping strategies?
2. Reset the clock (light/melatonin)?
3. Improve shift systems by minimising fatigue and risk!!!

Evaluating work schedules

- Work schedule features
 - Shift length
 - Start & finish times
 - Rest breaks
 - Rest days
 - Shift sequences
 - 'Quick returns'

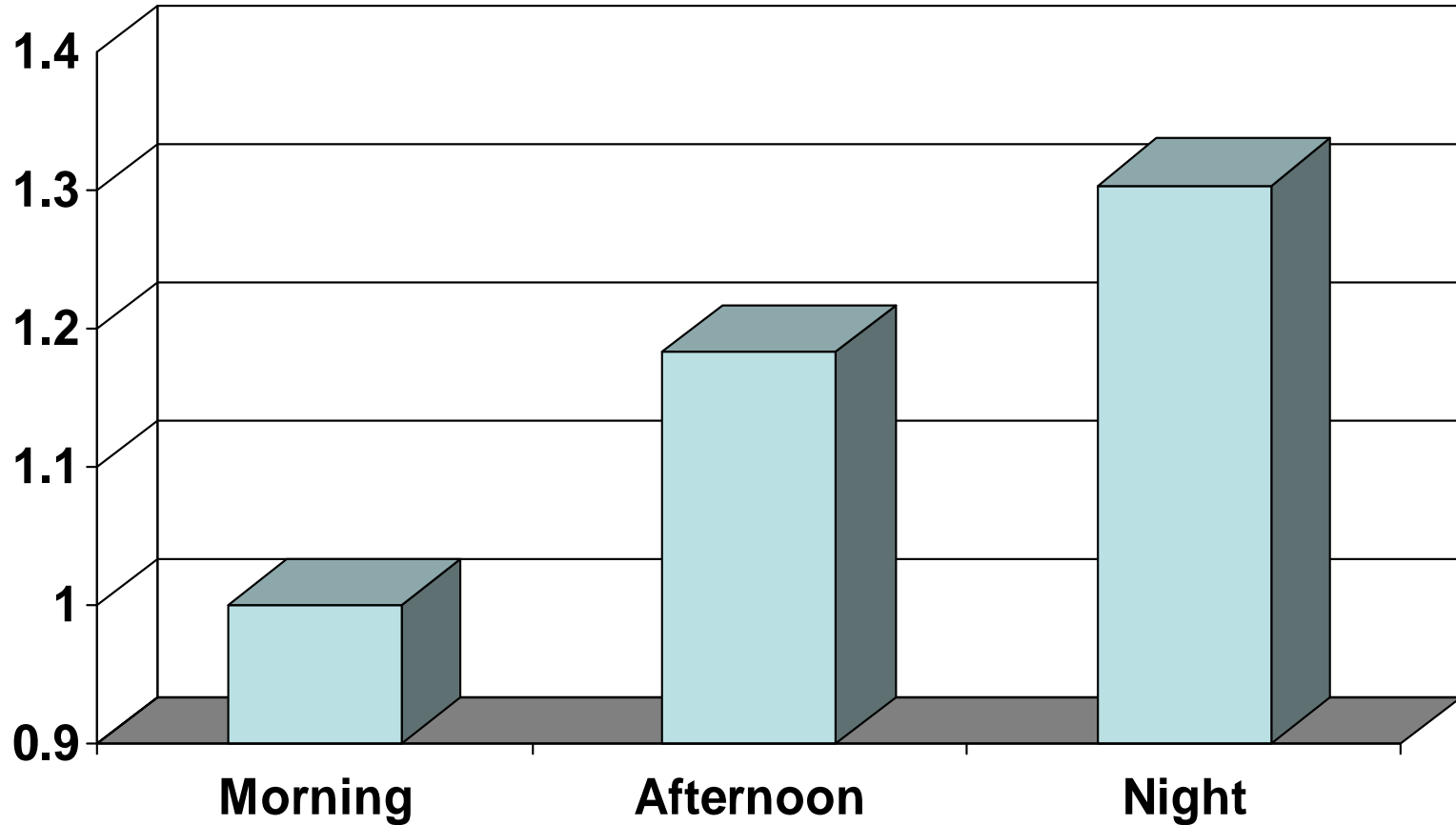


Mistakes, injuries & accidents

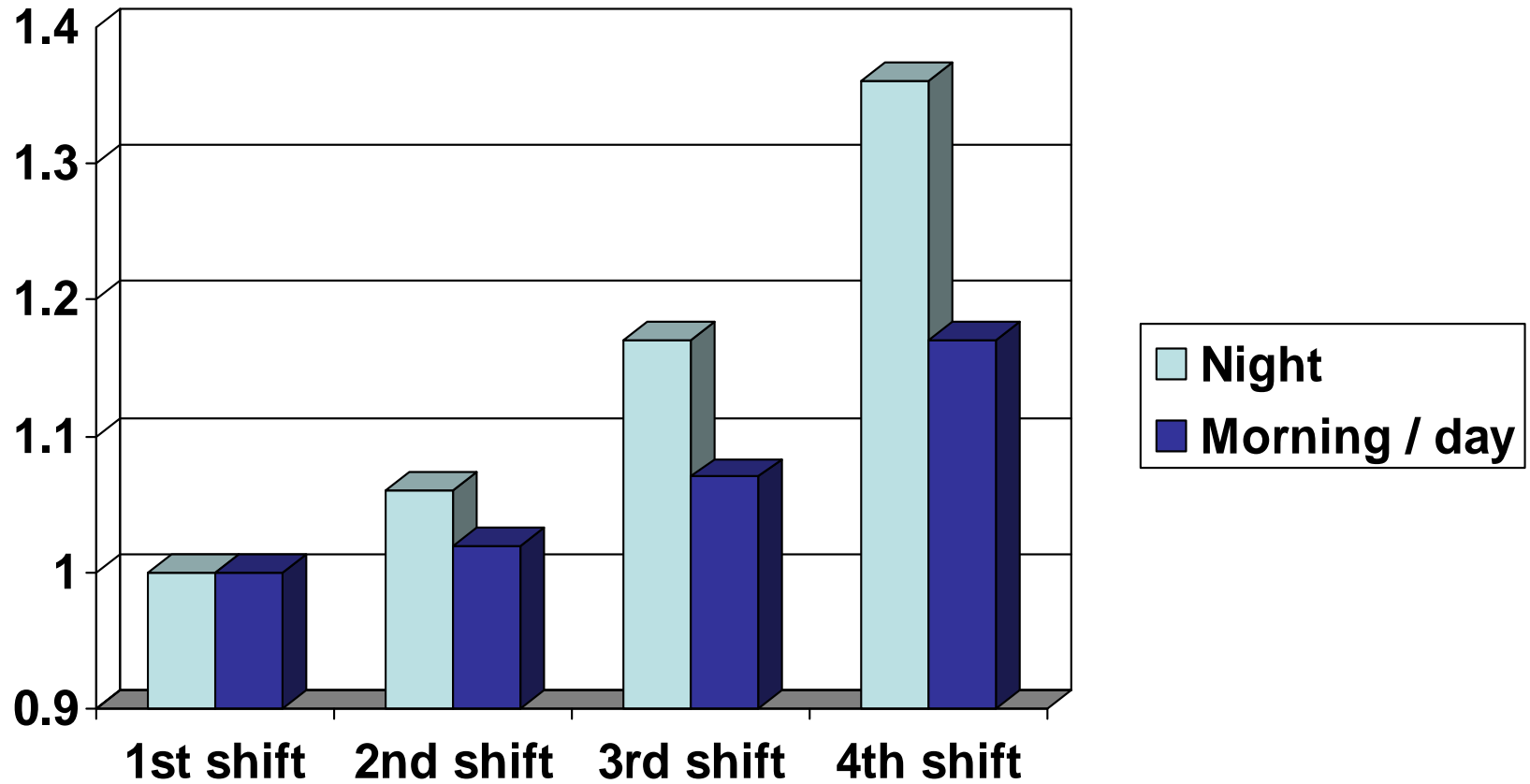
- Can be “pin-pointed” in time.
- Can be related to specific features of shift systems.
- Analyses based on studies in which the ***a priori*** risk is constant



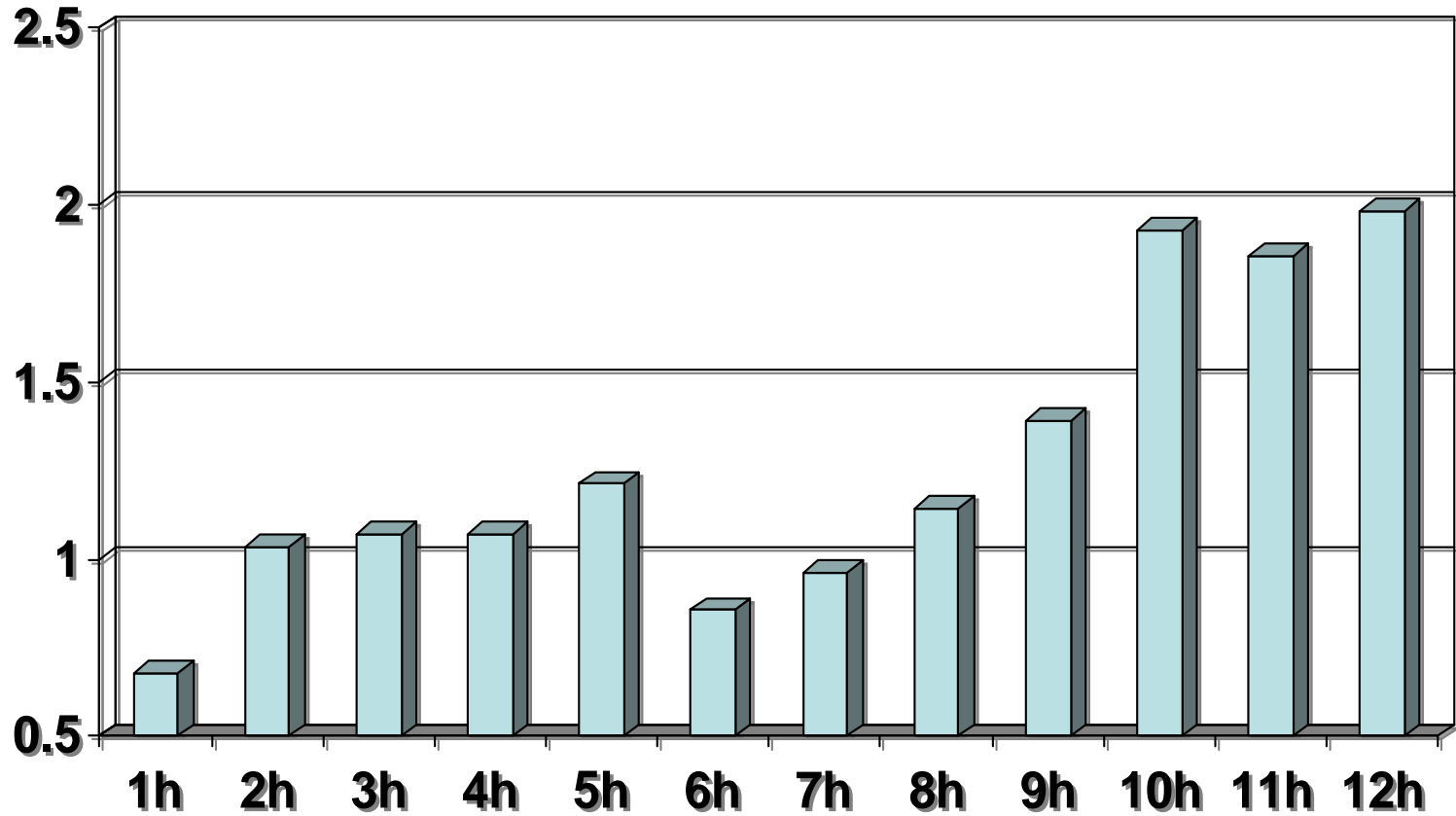
Risk across three shifts



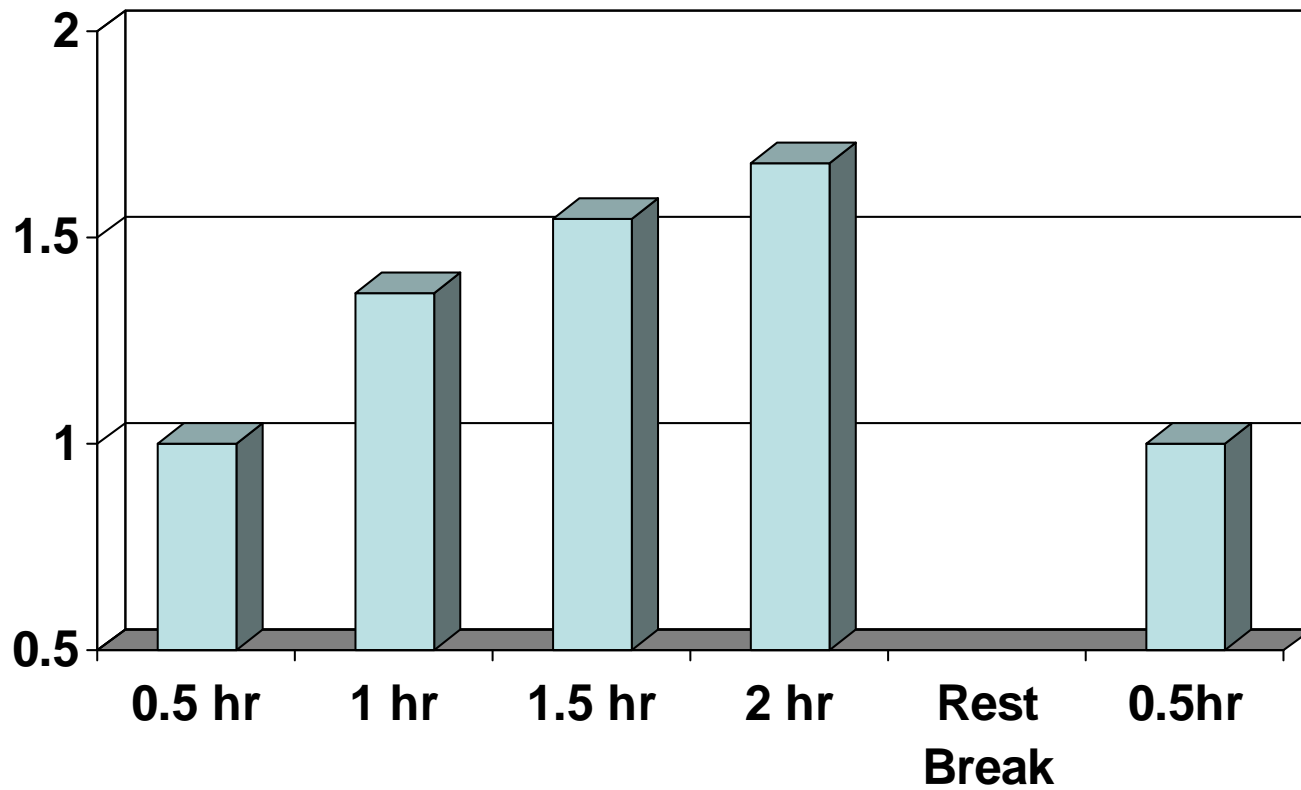
Risk over successive nights



Risk over hours on duty



Effect of breaks on risk



General ways of reducing problems: (avoid compromising by overtime or swaps!)

- Avoid spans of more than 2 or 3 night shifts.
- Avoid spans of more than 2 or 3 early (before 07:00) starts.
- Avoid extending shifts beyond 12 hours.
- Avoid spans of more than six successive shifts.
- Avoid quick (less than 11h) returns between shifts.
- Allow regular (e.g. 2 hourly) short (e.g. 15 mins) breaks.
- Alternate different tasks/roles as frequently as possible.
- Ensure spans of at least two rest days.
- Monitor impact of any changes to work schedules on fatigue, performance, sleep and health.

Also need to consider :

- **Situational factors:**
 - Nature of work
 - Commuting times
 - Public transport
- **Individual factors:**
 - Domestic circumstances
 - Age of shiftworkers



Conclusions:

- Long work hours & shiftwork can impair health, well-being & safety.
- No “good” work rotas, but:
- “Better” rotas:
 - Minimise the build up of fatigue
 - Maximise the dissipation of fatigue
 - Minimise sleep & circadian disruption

***For further information, contact:
p.t.tucker@swansea.ac.uk***