Examining the need for programmes to counter tiredness and fatigue in safety-critical industries

We help organisations improve key business metrics

Tiredness & fatigue is unproductive, costly, unhealthy and unsafe

Introduction

- Many organisations run excellent (occupational) health and wellbeing programmes for staff
- However, the elephant slumped in the corner of the room is Employee Energy
- More simply put – your staff are too tired to do their jobs safely and productively but neither you nor they know it
- According to the Centres for Disease Control tiredness and poor sleep is becoming ‘a public health epidemic’
- At any one time 20% of people in developed and 17% in developing countries are suffering sleep problems
- Tiredness and fatigue has a significant negative impact on health, productivity and safety.

Using recent research data and examples we hope to build a case that encourages you to take the first step in understanding whether you have a problem by assessing your staff population to ascertain the extent, impact and causes of tiredness and fatigue.

Framing the conversation

Sleep is the third pillar of health

- Sleep together with cardio vascular fitness and nutrition form the three pillars of good health
- Sufficient good quality sleep is also vital to keeping us healthy and productive

- With sufficient sleep we are more energetic, healthier, more successful and happier with our lives
- Sleep plays a major role in preparing the body and mind for an alert, productive, psychologically and physiologically healthy tomorrow.

Relevant statistics

- Across the developed world doctors are saying 1 in 3 patients are complaining of feeling tired all the time [1]
- Between 1999 and 2010 those sleeping less < 7 hours rose from 34% to 46% of the population [2]

Poor sleep, performance and safety particularly affect those working shifts.

- 75% of surveyed shift workers reported sleepiness on the job
  - 20% indicated that they had fallen asleep in the previous 12 months [3]
- 20% of shift workers reported frequently or occasionally making errors due to sleepiness
  - 29% indicated that sleepiness interferes with daily activities a few days per week
  - 68% reported sleep problems a few nights per week [3]
- 21% of aviation incidents are blamed on fatigue [3]
- 40% of fatal crashes involving commercial truck drivers are attributable to fatigue [4]

[1] GP Keith Hopcroft
[2] National Sleep Foundation
[3] NASA
[4] National Transportation Safety Board

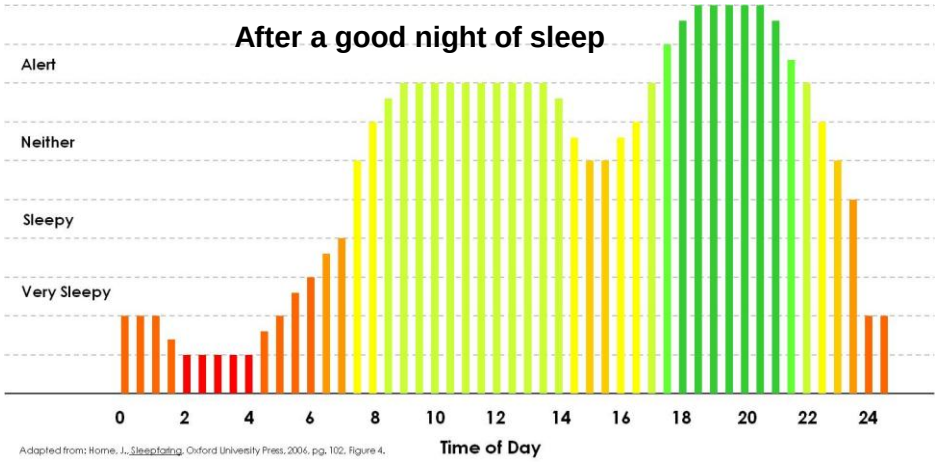
Impact of fatigue on performance & safety

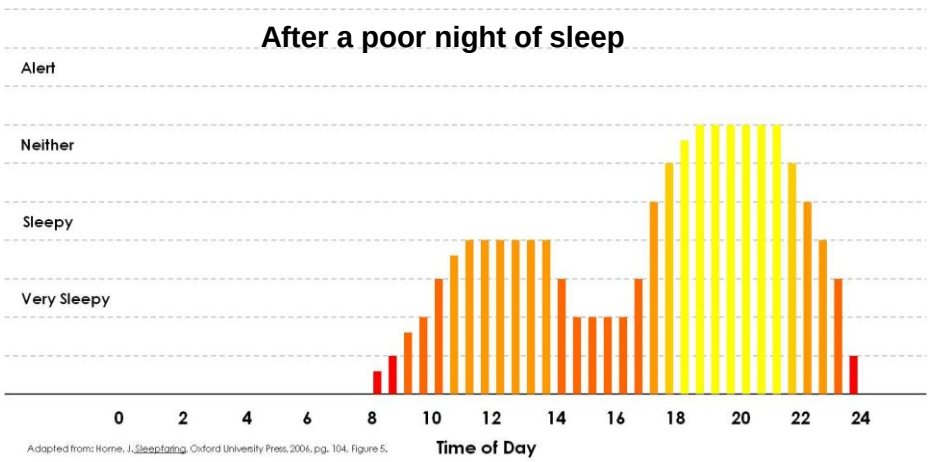
- Numerous studies have shown a clear link between fatigue and poor performance
- 17 hours of continued wakefulness or sleeping 4 to 5 hours a night for a week impairs performance to the same extent as being legally drunk [1]
- 6 hour sleepers are 11x more likely to make mistakes after 14 days of sleep restriction. This rises to 14x for 4 hour sleepers [2]
- Sleepiness accounts for 10% of accidents on UK roads, (20% on motorways and other monotonous roads). [3]

So when you think about the hours your staff are working – whether by necessity or borne out of a long-hours culture, ask yourself this – would you mind if that member of staff had just drunk two beers before they undertook their current task?

[1] Harvard Business Review
[2] Pennsylvania University
[3] Department of Transport & www.sign.ac.uk

How our alertness responds to sleep





- The graphs highlight the difference in alertness the following day after a good (left) and poor (right) night of sleep
- The graphs assume standard working hours
- After a good night of sleep we remain alert throughout the working day, even during the afternoon dip
- After a poor night of sleep our alertness does not rise above sleepy even at it's peak during the day.

[1] Adapted from: Horne, J., Sleepfaring, Oxford University Press, 2006

Impact of fatigue on health

- Sleeping less than 6 hours a night increases the risk of obesity by 23% versus 7 to 8 hour sleepers
  - This rises to 50% in 5 hour sleepers and 73% in 4 hour sleepers [1]
- Sleeping for less than 5 hours a night increases the risk of diabetes by 2.5x [2]
- Reducing sleep from 7 to 5 hours a night doubles the risk of dying of heart disease [3]
- We are also much more susceptible to minor ill health – coughs, colds and flu
- There is also a very significant link between poor health and stress – more on this later.

[1] US National Health & Examination Survey
[2] Boston University School of Medicine
[3] UCL & Warwick Universities

The effects of sleep deprivation

Introduction

- In experiments on rats those deprived of sleep died sooner than those deprived of food (though not water)
- Sleep deprivation is commonly used in interrogations
- 17 hours of wakefulness impairs performance to the same extent as a blood alcohol level of 0.05%
- We take riskier decisions when we are tired.

What evidence is there that fatigue is a problem?

Tiredness and fatigue is unproductive, costly, unhealthy and unsafe.

A recent multi-employer study conducted by the American College of Occupational Medicine and the Integrated Benefits Institute studied 15,000 employees' health-related productivity costs.

Productivity	Medical & Pharmacy	Total Costs
1. **Fatigue**	1. Cancer	1. Back / neck pain
2. Depression	2. Back / neck pain	2. Depression
3. Back / neck pain	3. Coronary heart disease	3. **Fatigue**
4. **Sleeping problems**	4. Chronic pain	4. Chronic Pain
5. Chronic pain	5. High cholesterol	5. **Sleeping problems**
6. Arthritis	6. GERD	6. High cholesterol
7. Hypertension	7. Diabetes	7. Arthritis
8. Obesity	8. **Sleeping Problems**	8. Hypertension
9. High Cholesterol	9. Hypertension	9. Obesity
10. Anxiety	10. Arthritis	10. Anxiety

Taking into account medical costs, pharmacy costs, presenteeism and absenteeism the greatest costs to organizations were identified as musculoskeletal conditions, depression and fatigue. Sleeping problems was the 5th greatest cost.

These results suggest a disconnect between the programmes organisations often run for their staff and the programmes that will yield the greatest returns. Typical programmes on diet, exercise, nutrition and smoking cessation, whilst laudable, will typically reduce risk factors which are less costly.

Why does poor sleep affect productivity

- We find it difficult to maintain our motivation or want to undertake new or more challenging tasks
- Our work-life balance will also suffer. Employees with low personal energy will not be able to make a full contribution in all aspects of their lives
- Professional and personal relationships start to suffer and they become resentful of the causes. This in turn leads to lower levels of employee engagement.

Furthermore:

- Our judgement, decision making and perception is also impaired
- We lose co-ordination and our motor skills suffer
- We become much less safe.

The bottom line is when we are alert and energetic we make a better contribution at work. We are more productive, less costly and safer. This translates into a healthier bottom line.

Tiredness and fatigue – cost implications

- Companies lose 520 hours per employee per annum simply by failing to manage their energy correctly - *Cranfield Management School*
- Presenteeism (being at work but unproductive) costs the UK economy £15bn per annum - *Dame Carole Black 'Health, Work and Wellbeing'*
- Lost productivity through a lack of sleep costs the world economy a staggering $350bn each year - *The Swedish National Institute of Working Life*
- The cost of sleep deprivation in the UK is £1.6bn a year - *UK Mental Health Foundation*
- Lost sleep costs the average US worker 11.3 days or $2,250 and the US economy $63.2bn in lost productivity every year - *Harvard Medical School*

How big is your workforce?

Now imagine you are losing £225,000 for every 100 employees [based on a $200 a day labour rate] every year unnecessarily.

What happens when tiredness and fatigue collide?

Maritime – The Exxon Valdez

- On March 24th 1989 the Exxon Valdez tanker grounded on Bligh Reef in Alaska
- An expert pilot took the tanker through the Valdez narrows before handing over to the Captain
- He instructed the helmsman to take the vessel out of the shipping lanes to avoid an area strewn with icebergs
- The Captain then handed over to the Third Mate with precise instructions to turn back into the shipping lanes when the tanker reached a certain point
- The accident happened because the tanker did not make the turn at the point instructed
- The National Transportation Safety Board found that fatigue was a significant contributory factor in the accident
- The NTSB found that the third mate could have had as little as 5 to 6 hours in the 24 hours before the grounding
- 258,000 barrels of oil spilt with a significant impact on the marine habitat and estimated total cost of c. $8 billion
- The direct costs to Exxon totaled c. $4.5bn with a significant dip in the company's share price.

Other maritime incidents

- **Shen Neng**: In 2010 the Shen Neng struck the Great barrier Reef carving a two-mile path of destruction. The ship's chief officer-on-watch, who was in charge at the time, had slept for barely two hours over the previous day and a half.

- **Herald of Free Enterprise**: In March 1987 the Assistant Bosun had taken a short break and was asleep when the ship dropped its moorings. When the ship left port the doors were still open. This was the greatest maritime loss of life in British waters.

- **Staten Island Ferry**: In October 2003 the Staten Island Ferry collided with a maintenance pier. It was found that the Assistant Captain was on Zolpidem for insomnia and Tramadol for back pain. 11 people died.

- **P&O**: In August 2012 the results of a survey of 500 P&O ferry officers found that exhausted cross-Channel ferry workers were suffering from sleep deprivation and stress and were a danger to their ships and passengers. They also found that fatigue-related incidents or accidents were frequent in both marine and customer service departments.

Aviation incidents

- **Air India**: In May 2010 an Air India crash killed 158 passengers and crew. It was reported that during the flight the pilot had slept heavily. The investigation found that sleep inertia was a likely factor in poor human functioning on the approach to land.

- **Colgan Air**: In February 2010 Colgan Air flight 3407 crashed on its approach to Buffalo. The NTSB found that pilot fatigue was a significant contributory factor. Long hours and low pay in regional airline pilots frequently lead to tiredness and stress. It was common for pilots to sleep in the staff room as they were not able to afford a hotel room.

- **JetBlue**: In March 2012 a JetBlue airline pilot went on a frightening in-flight tirade, making allusions to terrorists, causing the flight to be diverted. Testifying to the US Attorney's Office a psychologist said that the pilot was having a "brief psychiatric disorder" brought on by sleep deprivation.

Public transportation incidents

- **Texas Train Crash**: In 2004 a train crash in Texas killed three people and released poisonous gas into the air. Investigators found that “the engineer and conductor were likely asleep at the controls.” The investigators also noted in their report that “employee fatigue is a significant factor in many train accidents.”

- **Chinese sleeper bus**: In August 2011 a double-decker sleeper bus in China hit the back of a methanol tanker. The driver was driving whilst tired and failed to brake in time. A methanol leak caused electrical equipment in the bus to short circuit and both vehicles caught alight. 36 people died.

- **US Bus crashes**: Bus crashes in The Bronx, Oregon, Virginia and Illinois in recent years shine a light on the pressures in the American bus and coach industry. Low wages make long working hours a common phenomenon. Hours of service legislation, are routinely disregarded or distorted.

- **Trimet**: A campaign by the online newspaper *The Oregonian* uncovered the extent of driver fatigue in TriMet metropolitan bus and light rail staff. They found 21 incidences of drivers falling asleep at the wheel in just three and half years.

Road traffic accidents post shift

- **Montreal Fire Fighter**: In 2010 a volunteer Fire Fighter was heading home after a night shift in his pickup truck near Montreal. Apparently on cruise control, the truck ploughed through a line of six members of a triathlon club who were out cycling that morning killing three and injuring three others.

- **UK Nurse**: Earlier this year a nurse died in a head on crash after apparently falling asleep at the wheel. She had completed a 10-hour night shift, been to the local stables and had then given a talk to students at the University of Hull about a nursing career.

- **Australian Flying Doctors**: In Australia the Royal Flying Doctor Service is reporting an increase in call outs to deal with miners involved in road traffic accidents who are jumping into their cars after long and demanding shifts and driving long distances.

Other selected incidents

- **Space Shuttle Challenger**: January 1986. Whilst the primary reason for the crash was a faulty part, Sleep Researchers attribute questionable last-minute decisions to insufficient sleep and irregular hours. Two of the three top managers had had less than 3 hours of sleep for the 3 consecutive nights prior to the catastrophic mission.

- **Chernobyl**: April 1986. The reactor at the Chernobyl nuclear plant exploded during an experiment to test a potential safety emergency core cooling feature. Engineers involved at the time had been at work for 13 hours or more, and totally missed or were confused by waning signals on their control panels.

- **Three Mile Island**: March 979. The accident was initiated by mechanical malfunctions in the plant. However, the fundamental cause of the accident was operator error. Operators were too fatigued to notice right away when coolant water was lost. When they did notice, they were not alert enough to take care of the problem efficiently.

- **Peach Bottom**: In August 1988 the Peach Bottom Nuclear Reactor in Pennsylvania was shut down because workers were found sleeping on the job.

- **Selby Rail Crash**: In 2001 a Land Rover left the motorway and plummeted down an embankment onto the railway line. Two minutes later an inter-city train hit the trailer causing it to leave the track and career into the path of a freight train. Telephone records revealed that the driver had been on the phone and internet up to 03:58 before leaving at 04:30. As a result 6 commuters and 4 railway staff lost their lives.

Don’t let it be your company making the headlines!

The link between sleep and stress

The link between sleep deprivation and stress

- It is not a coincidence that stress and sleep deprivation are simultaneously rising at alarming levels
- They're like inseparable friends – or should that be mortal enemies – never far from each other
- When stressed we find it more difficult to get to sleep, to stay asleep and return to sleep after waking
- When we're tired we become more irritable, find it more difficult to cope and become more easily stressed
- It is human nature. When tired we become increasingly irritable
- At the heart of this is a loss of coping skills – we find it more difficult to maintain perspective
- What would normally be trivial is suddenly elevated in importance. Logic and reason are replaced by irrationality.

The link between sleep deprivation and stress (2)

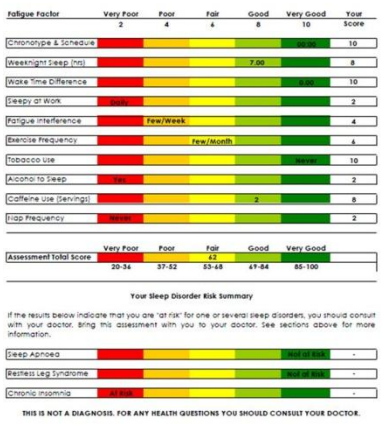
- We are also more likely to feel threatened
- A case study from policing the Montreal tuition fee riots found it more difficult for officers to control their emotions, deal with conflict, perceive what was happening around them and respond appropriately
- We lose concentration and our attention span shortens
- Creative thinking and trouble-shooting diminish
- Our vocabulary reduces and our communication skills suffer when we're tired
- As a result staff cannot communicate clearly in times of crisis or at the changing of a shift
- We also become more threatened when we can't find the words to explain our actions
- Our ability to deal effectively and cordially with (all) those around us is diminished
- Studies in soldiers and gamblers show we take more risks when we're tired.

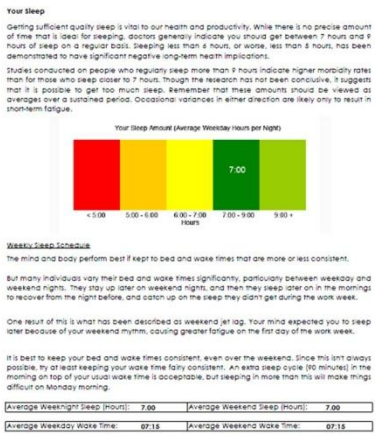
By running a programme to tackle tiredness, fatigue and personal energy you will also help combat stress. Given stress is now the leading cause of long-term absence in organisations this will help improve key business metrics.

What action should you take?

Where do you begin

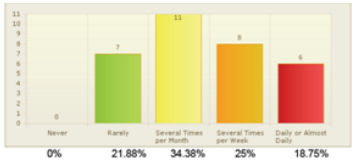
- As with any potential business issues the key to tackling the problem is to understand the extent of the problem
- To this end you should run a comprehensive assessment of the workforce that you would like to evaluate
- The individual should be able to see their results clearly and concisely and receive specific advice on key areas
- The organisation needs to be able to see the composite results (clearly no individual data)
- The composite results should tell you the extent, impact and causes of tiredness and fatigue
- Once the results are in the next stage is to determine the extent of the problem.





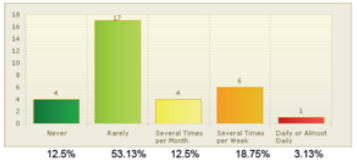
Frequency of daytime fatigue

Never or rarely	22%
Several times per month	34%
Several times per week	25%
Daily or almost daily	49%



Frequency of daytime fatigue interfering with work

Never or rarely	66%
Several times per month	13%
Several times per week	19%
Daily or almost daily	3%



For 34% fatigue interferes with their work at least a few times a month

We help organisations improve key business metrics

Tiredness & fatigue is unproductive, costly, unhealthy and unsafe

Benefits of using Third Pillar of Health services

- Eradicate a key individual and organisational safety risk
- Improve fatigue levels leading to more energy during the day
- Reducing fatigue improves work-life balance as staff make a better contribution to all aspects of life
- Improved work-life balance leads to greater employee engagement
- Increased staff engagement and energy leads to higher productivity
- Reduced fatigue leads to fewer staff costs – absenteeism, presenteeism and staff turnover
- Lower staff costs and higher productivity lead to increased efficiency.

About Third Pillar of Health

- Third Pillar of Health Ltd helps companies worldwide improve key business metrics by helping companies understand the extent, impact and causes of tiredness and fatigue in their staff populations and designing interventions to help reduce the problem once we have identified the specific issues in staff populations.

- We believe that for too long sleep has been the forgotten pillar of health. As a result sleep deprivation has become endemic across the world. We believe that this epidemic is curable and that the first step is education and awareness. We are passionate about helping individuals live happy, healthy, safe and productive lives with the parallel benefit of improving key business metrics for your organisation.

- We have worked with leading sleep research scientists in the US and UK to design our programme. The first stage of this is to run an assessment of your staff. The assessment is based on validated questions and takes 5 to 10 minutes to complete on a PC, tablet or smartphone. Our programme has been endorsed by the International Institute of Risk and Safety Management (IIRSM) and Third Pillar of Health is an accredited centre.

- We will then present the findings to your organisation and discuss the best ways to counter the specific issues which the assessment has identified in your staff.

- We are delighted to be offering our initial online assessment for just £10 per member of staff.

Take the first step to a healthier, happier, safer and more productive organisation and call us now on + 44 (0)845 686 0022 to order an assessment of your working population!

Some customers we have worked with previously

- "K" Line LNG
- Procter & Gamble
- Virgin Active
- Lawn Tennis Association
- Major multi-national drinks company
- Maintenance Management Limited
- Sanofi-Aventis
- Staffordshire University
- Urban Retreat
- Major Multi-national Chemical Company
- Billingham Machine Company
- The Richmond Group
- The University of Warwick
- Virgin Atlantic Airways
- Virgin Media
- ZBI Europe Limited
- ZBI Asia
- National Workforce Projects – Skills for Health
- NYSE Euronext LIFFE
- The Body Shop
- Playgate Limited
- Marble Bar asset Management
- GMAC RFC
- Rubicon Fund Management
- The Red Consultancy (Nytol)
- Mad Media (Windows Live)
- 2 independent personal trainers

"Maximising staff energy levels throughout the day has lead to longer periods of concentration and focus at previously lull points in the day."

Neil Harrison, Operations Manager, Maintenance Management Limited

Contact details

Marcus de Guingand
Managing Director, Third Pillar of Health

Email: marcus@thirdpillarofhealth.com
Office: +44 845 686 0022
Mobile: +44 7947 310381

Website: www.thirdpillarofhealth.com
Follow and interact with us on Twitter: @3rdPillarHealth