Key Stage 5

Shifting sleep problems

Pupil worksheet

Circadian rhythms

These are biological rhythms that follow approximately a 24 hour cycle. The name stems from the Latin; circa (meaning ‘about’) and diem (meaning ‘day’). Examples include the sleep-wake cycle, body temperature and hormone production.

During a 24 hour period, humans experience a period of sleep for around 8 hours and a period of wakefulness of around 16 hours. The cycle is controlled internally by a body-clock (an endogenous pacemaker), the main one being the supachiasmatic nucleus (SCN). It is also influenced by external cues (endogenous zeitgebers) such as light.

The problem with shift work

Shift work is any scheduled work outside of normal daytime hours (7 am to 7 pm). People who do shift work find themselves working, and therefore having to be alert, at night. This results in prolonged conflict between the internal body clock and external stimuli and can lead to excessive sleepiness when the worker has to be alert and difficulty falling asleep at the right time. The results of shift work disorder include reduced productivity and morale and, in some extreme cases, dangerous consequences. It is no coincidence that major disasters such as Chernobyl occurred in the early hours of the morning when shift-workers were tired.

There is also evidence that certain health risks are associated with regular shift work, including cancer, heart disease and Type 2 diabetes.

Your task

The director of Yangtze, a popular internet shopping company, has contacted you for advice. They currently employ people on a rotating shift pattern which changes every week. They work shifts of: 6am to 2 pm then 2pm to 10pm then 10pm to 6am

They are concerned about the health of their employees and want you to put together advice on how to help them avoid shift work disorder.

1. Work in a group of 3.
2. Each person will research one possible solution: changing how often shift patterns are rotated, using light therapy, using drugs.
3. In your research include evidence from scientific studies.
4. Rejoin as a group and discuss your findings. Put together your advice for the company.

http://www.oxfordsparks.ox.ac.uk/what-makes-you-tick
Key Stage 5
Sifting sleep problems

**Method 1: Changing how often shift patterns are rotated**

Currently, the shift is rotated every week. There is the option of making this rotation more or less frequent. Do some general research on the science of how each choice could help employees with shift work disorder.

In some companies employees either work in the day or at night. This is not changed. Discuss how this could help with shift work disorder but why it is not common.

**Evidence from studies:**

Czeisler et al (1982) 'Rotating shift work schedules that disrupt sleep are improved by applying circadian principles'. Journal: Science

Williamson and Sanderson (1986) 'Changing the speed of shift rotation: a field study'. Journal: Ergonomics

http://www.oxforosparks.ox.ac.uk/what-makes-you-tick
**Key Stage 5**

**Sifting sleep problems**

**Method 2: Using light therapy**

Do some general research on what this is and how employees would use it.

**Evidence from studies:**

Dawson, D. and Campbell, S. S. 'Timed exposure to bright light improves sleep and alertness during simulated night shifts'. Journal: Sleep


http://www.oxfordsparks.ox.ac.uk/what-makes-you-tick
Key Stage 5
Sifting sleep problems

Method 3: Using drugs
Do some general research on the different drugs available and how they would be used by the employees

Evidence from studies:
Touitou and Bogdan 'Promoting adjustment of the sleep-wake cycle by chronobiotics', Journal: Physiology & Behavior

Muehlbach MJ, Walsh JK. 'The effects of caffeine on simulated night-shift work and subsequent daytime sleep'. Journal: Sleep

http://www.oxfordsparks.ox.ac.uk/what-makes-you-tick