Key Findings

- Good sleep is a pre-requisite for older people’s well-being and ability to engage fully in daytime activities, whether living in their own homes or in a care home.
- Ageing per se is not necessarily related to poorer sleep.
- Older men and women would rather not go to their doctor for help with poor sleep because they expect to sleep less well as they age and believe they may be prescribed sleeping medication.
- The severity of insomnia symptoms associated with chronic disease can be reduced by self-help strategies based on Cognitive Behavioural Therapy for Insomnia (CBT-I) delivered in booklet form.
- Daily light exposure has some beneficial effects among older people with self-reported sleep problems living in the community.
- Care home routines, staffing levels and care practices influence both the sleep and nighttime experience of care home residents.
- Residential care homes have low levels of artificial lighting. Artificial light supplementation in communal areas can increase the time that care home residents spend under brighter light conditions without producing adverse effects.
- Sensitively designed new technology has much potential to support sleep in older people. Four prototypes developed were musical pillows, automatic bedroom lighting, an illuminated tray for easy access to items at night, and a portable hearing aid.
Background

Sleep is central to health and well-being, yet sleep can deteriorate with advancing age. Good sleep is a pre-requisite for older people’s well-being and ability to engage fully in daytime activities, whether living in their own homes or in a care home. Chronic health problems and pain in later life reduce the quality of night-time sleep. Among older people, untreated chronic sleep disturbance degrades their quality of life, inhibits recovery and rehabilitation following illness, and is an independent risk factor for falls.

Light is known to be a major factor influencing the body’s biological clock and sleep-wake patterns, and changes in the eye with increasing age reduce the amount of light reaching the ‘body clock’. As a consequence older people require 3-5 times more light than younger people. Lack of daytime light can also lead to poor differentiation between day and night, resulting in poor sleep and limiting daytime functioning.

Older people, both at home and in care home settings, remain the most likely and most vulnerable recipients of prescription sleeping medication which, in this age group, is associated with risks of impaired daytime functioning, falls and dependence. Among the very old, poor sleep quality and hypnotic drug use have been shown to exacerbate frailty and cognitive impairment. The need to reduce hypnotic drug prescribing, and provide effective non-pharmacological approaches to sleep management are policy and practice objectives.

Aims

• To understand the meanings and determinants of poor quality sleep among older people in the community and in care homes – by assessing social, psychological and environmental factors, medication use and health status, and identifying potential solutions.

• To develop a cost-effective approach to non-pharmacological self-management of insomnia among older people with chronic disease.

• To develop and evaluate ‘blue-enriched’ light in improving sleep of older people in the community and in care homes.

• To develop sensor-based products for frail older people at home and in care homes.

• To disseminate web-based, user-friendly, information and advice.
The Study

SomnIA was a four-year interdisciplinary collaborative research project. It involved eight interlinked research studies in the form of Work Packages, as illustrated in Figure 1.

Selected key findings are discussed in the following pages. Nine Briefing Papers and a list of SomnIA publications are available on the SomnIA website www.somnia.surrey.ac.uk

Disrupted sleep and ageing (WP1)

Researchers: Dr Alex Dregan and Professor David Armstrong

Health promotion over the last two decades has emphasised the importance for health and well-being of the ‘big four’ – a good diet, physical exercise, not smoking, and restricting alcohol consumption. A fifth health promotion message is also essential for good health and well-being, namely sleep. Sleep of a sufficient duration and quality is particularly important for healthy ageing.

SomnIA analysed a range of large-scale datasets to provide greater understanding about the extent of sleep problems in the population and the social factors underlying problematic sleep.

Key findings:

Sleep loss through worry does not increase with age. Economic factors and financial insecurity however seem to worsen sleep at all ages

Worry is a key cause of disrupted sleep. Analysis of two longitudinal datasets (English Longitudinal Study of Ageing, Health and Activity Survey) found that sleep loss through worry declined with age. Older people are more likely to have their sleep disturbed by worrying about family matters, safety and security, whereas in mid-life, sleep is also disturbed by worries about work and finances. We found a temporary increase in sleep loss through worry for all age groups in the early 1990s which may be explained by the economic downturn at that time.

The link between ageing and sleep varies between European countries

An analysis of 23 European countries about their sleep patterns (based on the European Social Survey) found considerable variation in reports of sleep disturbance between European countries. In some countries increasing age was associated with worsening sleep (as in Britain), but in other countries sleep did not deteriorate with age. Markedly worsening sleep with age occurred in East European countries, while the experience varied among West European countries. These results probably reflect variability in the ageing experience across Europe.

Figure 1. The SomnIA Work Packages
Sleep problems are strongly associated with socio-economic disadvantage
Among older people, sleep problems are strongly linked to socio-economic disadvantage, such as low income, lacking educational qualifications, and living in poor housing, but the strength of these associations was weaker in later life.

Older people’s strategies to improve their poor sleep (WP2, WP8)

Researchers: Dr Susan Venn and Professor Sara Arber

Understanding the way older people perceive and manage the challenges of poor sleep, and the activities and strategies they adopt to improve their sleep can assist other older people in identifying ways to optimize their sleep.

Key findings:

Older people expect their sleep quality to deteriorate as they age
While sleep quality may deteriorate in later life, there are other factors that influence the quality of older people’s sleep, such as health problems and taking medications. Therefore older people should be encouraged to seek medical advice to rule out other causes of poor sleep. Health professionals need to be aware that poor sleep is not just a result of ‘age’ per se.

Older people would rather not go to their doctor for help with their poor sleep
People with sleep problems often do not visit a doctor because they believe they will be prescribed sleeping medication, which they would rather not take.

Older people should be made aware of the range of non-pharmacological treatment options for poor sleep that are available from doctors, as well as through changing their own strategies for coping with poor sleep.

Taking a nap may be beneficial to enable ‘active ageing’
Taking a nap can be a valuable way of maintaining alertness and enabling older people to undertake their routines and activities. It is important to counteract the stigma held by some older people that ‘napping’ can be regarded as a sign of laziness. While planned naps can be beneficial for maintaining daily activities, long or frequent napping may adversely impact on night-time sleep quality.

Advice is available from a website module called ‘Sleep Problems in Later Life’
www.healthtalkonline.org/Later_life/Sleep_problems_in_later_life

This web module presents the perspectives of older people with poor sleep, including their decisions on treatment options and strategies for coping with poor sleep. The web module also provides an educational resource for nurses, GPs and hospital doctors, thereby helping to promote better communication between older patients and health professionals.

Sleep and night-time care provision in Care Homes (WP3)

Researchers: Dr Ingrid Eyers, Emma Young (née Cope), Dr Theresa Ellmers and Dr Rebekah Luff

Although care homes provide 24 hour care, most studies of care homes focus on the daytime and omit the night. SomnIA explored the causes of poor sleep for care home residents by examining their daytime activities and night-time staff routines. We studied 10 care homes and showed how sleep of residents was influenced by patterns of night-time care, staffing levels, daytime activities and the care home routine.

Key findings:

Sleep in a residential care setting needs to be viewed as part of the full 24 hour time period as residents often fall asleep during the day
Both the physical and social environment of a care home impact on a residents’ experience of sleep. Also, individual factors, such as disability, pain, incontinence and cognition may affect sleep. There needs to be raised awareness of the fundamental importance of sleep for older people living in care homes. Improvements could be made to social care policy, regulations, care home culture and staff training by considering care homes as 24 hour care environments and giving equal importance to both day and night time staffing and care practices.
Care home residents have broken night-times not only due to their age and frailty
Older people living in care homes have more disturbed sleep than older self-reported ‘poor sleepers’ living in their own homes. This indicates more broken sleep and/or daytime inactivity or napping among care home residents.

Care home residents spend long hours in bed
Many residents felt that they spent too long in bed. The average time residents spent in bed at night was 10hr 50mins and they spent over 2 hours in bed awake each night. A key contributory factor was that staffing levels and staff shift patterns often did not enable staff to give residents choice over when they went to bed and got up, so residents compromised to fit in with the care home routine.

Routine monitoring of residents at night disturbs their sleep
Care practices at night include regular monitoring of residents for continence care and risk reduction. Staff balance resident choice against care practices required of staff and the needs of the care home, but residents’ sleep is not always prioritised. The regularity of these checks and whether they involve waking residents is not currently well balanced against the importance of residents’ sleep.

Light improves sleep in older people (WP5)
Researchers: Dr Katharina Lederle, Dr Benita Middleton and Professor Debra J. Skene

Many older people suffer from sleep problems and decreased daytime alertness which may, in part, be caused by a dysfunction of their circadian ‘body clock’. Obtaining bright light during the day may reduce sleep problems and enhance daytime performance. Research studies have shown short wavelength blue light to be most effective in influencing the body’s sleep-wake system. In addition, ageing is accompanied by many changes within the eye, such as pupil size and increased lens density, which reduce the amount of light, particularly blue light, entering the eye.

Key findings:

Older people should spend more time outdoors
Because of changes in the eye with ageing, older people require more light than younger people to co-ordinate their ‘body clock’ and their sleep-wake cycle. Older people should seek to spend more time outdoors to maximize their daylight exposure, whether engaging in physical activity or simply sitting in the garden or a park.

Timed artificial light exposure can produce beneficial effects on sleep and activity
The SomnIA light trial in older people’s homes found that exposure to 2 hours of light in the morning and 2 hours of light in the evening affected participants’ sleep and activity with the effects dependent on the light intensity. The lower light intensity resulted in earlier sleep onset times and improved sleep with less awakenings at night.

Blue-enriched light significantly delayed the timing of sleep
The SomnIA light trial also found that, compared to more traditional white light, blue-enriched light significantly delayed time of going to sleep at night.

Supplementing light in Care Homes (WP6)
Researchers: Dr Samantha Hopkins, Dr Lloyd Morgan, Daniel Barrett, Dr Benita Middleton and Professor Debra J. Skene

Previous research has indicated that increasing the level of room lighting in care homes during the day may slow down loss of mental ability and improve some aspects of residents’ sleep. SomnIA studied existing levels of lighting and the effects of increasing the lighting levels in selected communal living rooms in seven care homes over a 12 week period. The photographs show installation of experimental bright lights in a communal room in a care home (figure 2), and a care home with the experimental bright lights (figure 3).
Blue-enriched light supplementation had positive and negative effects

The blue-enriched lights increased residents’ activity levels during the day and night. Compared to control white lighting, the blue-enriched light advanced residents’ rest-activity rhythm, reduced self-reported anxiety and reduced sleep quality. However, blue-enriched light had no effect on resident’s daytime alertness and performance.

Key findings:

Light levels in care homes are low; light supplementation improves light levels

In the absence of natural light, lighting levels in the 20 communal rooms we studied were low and not uniform, leaving areas of poor visibility. By contrast, the experimental light conditions produced uniform, significantly higher light levels, see figure 3.

With light supplementation, residents spent more time under brighter light conditions

By increasing the illumination in selected communal rooms the time that care home residents spend under brighter light conditions can be greatly increased, which is likely to improve residents’ ‘sleep-wake’ patterns and increase their activity levels during the day.

Care home residents did not report any problems with the increased light levels

The experimental lighting did not produce any significant adverse effects such as headache, eye strain or discomfort, irritability or fatigue, indicating that the lights were well tolerated by older care home residents.

Self-management booklets improve insomnia symptoms (WP4)

Researchers: Professor Kevin Morgan, Pamela Gregory, Dr Maureen Tomeny, Claire Gascoigne and Dr Beverley David

Among older people the risk of persistently disturbed sleep is increased by chronic health problems, like arthritis, diabetes, heart disease and cancer. A randomised trial evaluated the effectiveness of cognitive behavioural management for insomnia (CBT-I) delivered through a programme of six self-help booklets that were sent out weekly. This programme addressed the key components of treatment and health education typically included in therapist delivered CBT-I, such as the basic ‘do’s’ and ‘don’ts’ for optimal sleep - restricting time in bed in order to increase night-time sleepiness, setting realistic expectations for sleep, and strategies for ‘winding down’. We measured a range of outcomes one week after the self-help programme, then three months and six months later.

Key findings:

Patients in the self-help group reported improvements in their sleep quality and reductions in insomnia symptoms

The study found that self-help CBT-I could significantly improve global sleep quality and reduce the extent to which insomnia symptoms had an adverse impact on their daily lives. It improved sleep on a number of dimensions over a six-month follow-up period.

Self-help treatment had no effect on levels of daytime fatigue

Fatigue is a feature of both insomnia and chronic disease. This important negative finding suggests that the fatigue measured in this trial was more closely associated with disease processes than with the sleep symptoms per se.
Most treated patients would recommend the self-help programme to others

On completion of the trial, we sent out a brief questionnaire to capture impressions of the self-help programme. When asked ‘would you recommend this programme for others (with a problem similar to yours)?’ - most patients (73%) unequivocally said ‘yes’.

In summary, weekly self-help booklets based on self-help CBT-I can make a major difference in improving sleep, and their use should be more widespread among patients consulting their doctor with problems sleeping. They represent a cost-effective alternative to sleeping medication, and have no longer term adverse effects. Providing accessible, evidence-based information on the optimal management of sleep problems should be considered for all patients reporting insomnia symptoms in primary care settings.

Use of assistive technologies can improve sleep (WP7)

Researchers: Dr Bruce Carey-Smith, Mrs Nina Evans and Professor Roger Orpwood

Technological innovations have the potential to improve the quality of sleep of older people. Over recent years assistive technology in the home has used sensors to monitor people’s behaviour and then provide support based on the insights gained. The SomnIA research demonstrated that such support can be of assistance during the night, especially for care home residents.

Key findings:

Four ideas for use within care homes were developed:

- **Night-time tray** enables residents to satisfy their needs during the night by storing and then accessing a drink, glasses, care alarm, etc. It automatically illuminates on contact and thereby enables lower night-time light levels to be used in the room (see figure 4).

- **Musical pillow** plays sounds through the pillow such as gentle music, radio or TV, or a recorded voice. The sound fades away after a set time but can be simply turned on and off by the resident.

- **Automatic lighting** provides lighting both for the resident when they need it and for care staff when coming into a room at night. Its design provides good background lighting without disturbing sleeping residents.

- **Night-time communicator** is a hand-held external hearing aid that care staff can use to communicate with residents at night without shouting and disturbing other residents (see figure 5). This is primarily for residents who wear a hearing aid during the day.

Technology developed with close involvement of elderly users and care staff can have a real impact on improving sleep quality

All four technologies were well received by both care home residents and care staff. They are not expensive but have real potential to support quality sleep. For older people in the community the use of the musical pillow was most promising.
Conclusion

The SomnIA project has raised awareness of the importance of optimizing the quality of sleep among older people in order to enhance their well-being and potential for ‘active ageing’. It has shown the ways that older people with poor sleep can use a range of strategies to improve their sleep without resorting to sleeping medications. A SomnIA randomized control trial showed that weekly self-help booklets can make a major difference in improving sleep among older people with chronic illnesses. Sleep among care home residents is often poor because of night-time checking by care staff, and care home residents often spend very long hours in bed, including substantial periods awake. Obtaining sufficient light is essential for older people in order to ensure that they have an optimum sleep-wake cycle, with lack of light during the day a contributory factor in poor night-time sleep. Spending more time outdoors in daylight and improving daytime lighting levels in the home and in care homes can improve sleep. A major role can be played by designing new assistive technology devices that can facilitate sleep, especially in care homes.

Published by the NDA Research Programme
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