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# Light as an intervention to manage distressing symptoms in dementia: a literature review

Grahame Smith presents a summary of the evidence base for light therapy in dementia

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## Abstract

This paper presents a literature review on the use of light as an intervention to manage distressing symptoms in dementia.

## Key words

Dementia, symptoms, light, interventions, therapy, literature review, evidence base

## Reference

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## Introduction

With the right support, living well with dementia can become a reality – particularly where a mental health nurse's practice is underpinned by the best available evidence (Woods et al, 2013; Department of Health, 2012).

Contemporary evidence suggests that a comprehensive and integrated package of interventions should be offered to a person who is diagnosed with dementia and should include 'light' as one of these interventions (Department of Health, 2012; NCCMH, 2007/2011; NICE, 2011).

## Good practice

Good practice guidance suggests that light can be used in a number of different ways in the care of people with dementia, and in addition to this guidance there is increasing evidence that light has a specific role to play in the management of distressing symptoms such as agitation and aggression and disordered sleep (Woods et al, 2013; Vardy and Robinson, 2011; Azermaia et al, 2012; NCCMH, 2007/2011; NICE, 2011).

It is important to note that using light as an intervention in dementia is in its early stages. There is some promising evidence, but as yet not enough evidence for it to be formally and robustly recommended, though due to its increasing use it is essential that mental health nurses understand its value within their practice (Woods et al, 2013; Forbes et al, 2004; The Scottish Intercollegiate Guidelines Network, 2006; Dijkstra et al, 2006; NCCMH, 2007/2011; NICE, 2011; Department of

Health, 2009). Based on the work of Innovate Dementia, a European-funded project, this paper aims to provide a summarised overview of the literature and evidence related to the use of light within the dementia field.

Innovate Dementia is three-year project that started in April 2012. It aims to explore, identify and develop sustainable solutions to the everyday challenges of living with dementia (Woods et al, 2013; WHO, 2012; Prince et al, 2011).

Light is a potential solution the project was keen to explore due to its increased use across North West Europe, specifically in the Netherlands and in some parts of the UK (Woods et al, 2013). The first phase of the project was to undertake a literature review of the evidence, presented in a 'baseline' report in March 2013. The second phase, based on the recommendations from the baseline report, was to use and evaluate an intelligent lighting system within a dementia ward environment, and this work is still ongoing (Woods et al, 2013).

The interest in using light as an intervention or light as therapy has arisen from noticing that distressing symptoms in dementia such as agitation and aggression can be worse at certain times of the day, commonly the late afternoon to evening – also known as the 'sundowning phenomena' (Vardy and Robinson, 2011; Ballard et al, 2009; Ballard et al, 2008; Bachman and Rabins, 2006).

Traditionally these symptoms have been managed through the use of pharmacological treatments, but due to the side-effects of these treatments there has been a move

towards using non-pharmacological treatments (Snowden et al, 2003; Ballard et al, 2009; Ballard et al, 2008; Corey-Bloom et al, 2006; Douglas et al, 2004; Hogan et al, 2008; Eun-Hi Kong et al 2009; Sadowsky and Galvin, 2012, NICE, 2011).

Using non-pharmacological interventions that includes light is a fairly recent development and on this basis there is a need for more rigorous research (Baillon, 2002; Azermaia et al, 2012; Livingston et al, 2005; NCCMH, 2007/2011; NICE, 2011).

Some of the most promising research has been in the use of light as a way of managing disordered sleep, which is another common symptom of dementia, though disordered sleep is not uncommon among older people (Brown et al, 2011; Wolkove et al, 2007; Morton et al, 2005).

This age-related occurrence is **be** linked to the ageing process. A study by Turner and Mainster (2008) highlights that age-related changes in the eye can adversely affect the older adult's capacity to receive the required light levels throughout the day, and this in turn may negatively impact upon an individual's sleep-wake cycle.

Turner and Mainster also make the point that if an individual is reliant on artificial lighting then this can compound the problem as artificial lighting is 'dimmer and less blueweighted than natural daylight' (2008: 1439). The implication for mental health nursing practice is that people with dementia require exposure to natural daylight that is consistent with a normal rest-wake cycle, **light** in the day and less light at night, and where access to daylight is restricted then artificial light should be equivalent to daylight (Torrington and Tregenza, 2007).

A systematic review by Dijkstra et al (2006) to 'determine the effects of physical environmental stimuli in healthcare settings on the health and wellbeing of patients', supports this view indicating that 'there were predominantly positive effects found for sunlight' (pp166). Aarts et al (2006: 47) also highlights that there is a 'positive correlation between sleep efficiency and exposure duration to high intensity light, meaning that more light is related to efficient sleep'.

Receiving the right amount of light at the right time is also neurologically important in that there is evidence that a disrupted circadian rhythm in dementia is linked to an individual's melatonin levels. Melatonin

induces drowsiness and this action is inhibited by daylight (de Jonghe et al, 2010; Hanania and Kitain, 2002; Hatfield et al, 2004; Wirz-Justice, 2006; Riemersma, 2004).

A study by de Jonghe et al (2010) indicates that agitated behaviour in dementia, specifically the sundowning phenomena, can improve when treated with melatonin and on this basis it is postulated that sundowning behaviour is explicitly related to a 'disturbance of the circadian rhythm'.

This study concurs with Hanania and Kitain's (2002: 338) view that 'plasma melatonin levels play an important role in the regulation of the sleep-wake cycle'. This disruption has a cyclic effect in that circadian disruption in dementia can in turn exacerbate existing behavioural problems.

The significance for mental health nursing practice is that to effectively manage the rest-wake cycle of a person with dementia, including any related behavioural difficulties, the mental health nurse also needs to effectively manage their exposure to light (Turner and Mainster, 2008; Mishima et al, 2001; Shirani and St Louis, 2009).

At a holistic level Carvalho-Bos et al (2007: 92) argues that 'treatments that enhance daytime activity and the stability of the rest-activity rhythm may improve wellbeing', enabling people with dementia to live well.

In relation to the specific and controlled use of light Terman and Terman (2005) highlight that timed light exposure has some promise for the treatment of sleep disorders in dementia. Terman (2007: 497) makes the point that 'the rest-activity disturbance of dementia has been partially allayed under light therapy'.

Wirz-Justice (2006) and Skjerve et al (2004) also point out that there is some promise in using light therapy. Further to 2006, a systematic literature by Brown et al (2011) suggests that light therapy of all the non-pharmacological interventions has more 'conclusive' evidence in reducing disorder sleep than other interventions.

A study by Sloane et al (2007: 1524) using 'a cluster-unit crossover intervention trial involving four conditions: morning bright light, evening bright light, all-day bright light, and minimum standard light' on older adults with dementia concluded that 'bright light appears to have a modest but measurable effect on sleep in this population, and ambient light may be preferable to stationary devices such as light boxes'.

In terms of using light to manage agitation in dementia research, studies to date have struggled with the complex nature of this type of research.

A study Ancoli-Israel et al (2003) promisingly found a 'shift in the peak of agitated behaviour' – more so in mild dementia than severe dementia, though a randomised trial by Dowling et al (2007) concluded that 'bright light therapy did not clinically affect neuropsychiatric behaviours (pp971).

The Dowling et al study also noted that it was difficult to control complex factors that may have adversely impacted upon their findings such as not being able to clearly quantify agitated behaviour and not being able to discount the impact of prescribed medication (Dowling et al, 2007).

Interestingly some studies focusing on sleep have also looked at restlessness, a form of agitated behaviour in dementia. Studies by Van Someren et al (1997), Sloane et al (2005) and Sloane et al (2007) highlight the potential of high intensity light in the management of sleep problems and also restlessness behaviour in dementia.

Further to this a study by Van Hoof et al (2009) exploring the intensity of light in managing restlessness suggests that 'high-intensity bluish light may play a role in managing restless behaviour and improving circadian rhythmicity in institutionalised older adults with dementia' (pp146).

Using light as an intervention in dementia is not just to confined to managing sleep disturbances and agitated type behaviour. Teresi et al (2000: 417) highlights the 'environment is an area that is critical to specialised dementia care', which includes the use of lighting; while Boyce (2003) specifically stresses the importance of lighting quality.

Voermans et al (2007: 158) makes a further point that 'falls in older people are a common, dangerous and frequently incapacitating problem'. On this basis good environmental lighting can help to prevent falls and it can potentially reduce agitation by enabling orientation and helping people with dementia make sense of their environment (Chang, 2004; Hughes and Adams, 2012; NCCMH, 2007/2011; NICE, 2011).

Using light to manage the environment and prevent falls is part of a package of 'healthy' strategies the mental health nurse can use, which includes paying attention to the use of colour, floor coverings, signage, and

accessibility (Doody et al, 2001; Evans and Cotter, 2008; NCCMH, 2007/2011; NICE, 2011).

As mentioned previously light as an intervention in dementia is 'new' and there is a need for more robust research, which includes more randomised controlled trials (Thorpe et al, 2000; Burns et al, 2002; Ayalon et al, 2006; Dijkstra et al, 2006).

This view was echoed in a Cochrane review by Forbes et al, (2004) on 'bright light therapy (BLT) in managing sleep, behaviour, mood, and cognitive disturbances associated with dementia'. The study concluded that at the moment 'there is insufficient evidence to assess the value of BLT for people with dementia' (pp2).

The Scottish Intercollegiate Guidelines Network (2006: 10) guidance for managing people with dementia also suggests that 'Bright light therapy is not recommended for the treatment of cognitive impairment, sleep disturbance or agitation in people with dementia'.

Even though light as a therapy is not recommended the NICE (2011) guidelines for dementia suggest using high light levels and providing access to natural light. This is with a focus on improving an individual's sleep-wake cycle.

## Challenges

The challenge for researchers and practitioners interested in this area relates to knowing when to use light as an intervention, at what stage of the condition, and how much light should be used, including optimal timing and duration (Terman and Terman, 2005).

It is also important, especially in today's climate of community care, that research explores the utility of lighting technologies within the home, their application by informal carers, and their 'fit' within a care package approach (Cook, 2012; Topo, 2009; Hulme et al, 2010; Carswell et al, 2009; Koch et al, 2006; Kolanowski and Whall, 2000; McCullagh et al, 2009; Prince et al, 2009).

In the search for more cost-effective solutions future research will also need to determine whether the use of light technologies in the effective management of dementia delays the transition for home-based care to hospital/nursing home care (Lawlor, 2002; Hulme et al, 2010; Woods et al, 2013).

Where light technologies are used within institutional settings there is a drive to

understand the generalised impact of these technologies, but it has to be recognised that there should be a desire to understand how these technologies can be tailored at an individual level, the level where care is ultimately provided (Cutler and Kane, 2002; Kverno et al, 2009).

This increasing use of light technologies will also create a training need, not just in terms of delivering this type of intervention, but also in terms of clinical decision-making.

On this basis research will be required to assist the mental health nurse in the process of identifying when these technologies should be used and when they should not (Mason and Adeshina, 2011; McGilton et al, 2007; Woods et al, 2013; NCCMH, 2007/2011; NICE, 2011).

## Conclusion

There is promising evidence that light has a significant role to play in the management of distressing symptoms in dementia – specifically disturbed sleep and associated restlessness (Montgomery and Dennis, 2004).

Light can also improve the environment for individuals with dementia, which includes falls prevention (NCCMH, 2007/2011; NICE, 2011).

As the use of light technologies in the care delivered to people with dementia is increasing, mental health nurses will be exposed to these technologies on a more regular basis. Therefore based on the work of the Innovate Dementia project the following points should be considered:

- More controlled trials are required within the area of symptom management; these trials would need to consider such technical factors as the intensity, duration, spectral content, and method of exposure of the light therapy (Woods et al, 2013).
- Lighting research has to be care-packaged focused rather than just reductionist. Future research cannot just consider the rest-wake cycle in isolation – it would need to consider rest-wake activity cycle in conjunction with diet and exercise, and it would also have to be sensitive to the community-based nature of care delivery (Woods et al, 2013).
- Future research has to consider lighting as a way of managing the environment as well as symptom management; it would also need to consider any future training requirements including the development of specific assessment tools (Woods et al, 2013). **MHN**

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