

# Sensory stimulation in the treatment of neuropsychiatric symptoms of dementia

## Abstract

The prevalence of dementia in Ireland is predicted to more than double over the next 25 years. As this population grows, cost-effective interventions must be implemented. While pharmacological therapies are effective in slowing disease progression, especially in the case of Alzheimer's disease, they are not as effective in treating neuropsychiatric symptoms. Neuropsychiatric symptoms increase healthcare costs, caregiver burden and patient comorbidities. This article explores the use of stimulation-oriented therapies to prevent and alleviate these neuropsychiatric symptoms. Interventions such as Sonas Activating Potential for Communication, cognitive stimulation therapy, aromatherapy and music therapy are promising; however, sound evidence is lacking and stronger studies must be conducted before evidence-based recommendations can be provided.

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## Introduction: dementia and its role in Ireland

Dementia is an umbrella term for all acquired diseases that cause a progressive and often irreversible decline in memory and cognitive functioning; it is characterised by both cognitive and non-cognitive symptoms.<sup>1</sup> In Ireland, the approximately 41,740 people suffering from dementia is predicted to more than double by 2036.<sup>2,3</sup> The current annual cost of providing informal and formal care to people with

dementia is estimated to be €1.69 billion.<sup>2</sup> With the ever-growing elderly population, these financial demands will only grow.<sup>2</sup> Therefore, it is important to utilise cost-effective and efficacious dementia treatment.

Dementia patients are often unable to find bearings in their current reality as a result of their memory impairment and thus become agitated. Agitation is one of the main neuropsychiatric symptoms

associated with dementia and encompasses a wide array of manifestations ranging from sleep disturbances, irritability, stubbornness and excessive anger, to wandering, pacing, flailing and kicking.<sup>1</sup> If caregivers learn to recognise the early signs of behavioural disturbances, they can calm patients and improve the quality of life for the caregiver and patient alike.<sup>4,5</sup>

While pharmacological interventions help to slow the progression of dementia,<sup>6</sup> endeavours must also be made to treat neuropsychiatric symptoms that might arise. Non-pharmacological treatments in dementia can be classified as being emotion oriented, cognition oriented, behaviour oriented and stimulation oriented.<sup>7</sup>

Stimulation-oriented therapies aim to engage various senses and, while useful in all patients, are particularly beneficial in patients with severe dementia and neuropsychiatric symptoms.<sup>7</sup> Many neuropsychiatric symptoms stem from problems within the environment itself.<sup>1,7</sup> This article will explore various stimulation-oriented therapies that are used in Ireland, or could be implemented as adjunct therapy. These interventions include multisensory environments, Sonas Activating Potential for Communication (Sonas APC), cognitive stimulation therapy (CST), aromatherapy and music therapy.

## Standard pharmacological approaches to dementia

While no cure exists for dementia, pharmacological treatments that slow disease progression are available.<sup>8</sup> According to the United Kingdom's National Institute for Clinical Excellence (NICE) guidelines, Alzheimer's disease, one of the main causes of dementia,<sup>9</sup> can be treated with the acetylcholinesterase (AChE) inhibitors and memantine, an N-methyl-D-aspartic acid (NMDA) receptor agonist.

An important consideration in the treatment of dementia is the presence of neuropsychiatric symptoms.<sup>4,10</sup> These symptoms are associated with increased length of hospital stay and increased costs.<sup>4,10</sup> Sink *et al.* (2005) conducted a systematic review and found that only the atypical antipsychotics risperidone and olanzapine were effective in the management of neuropsychiatric symptoms.<sup>4</sup> According to a 2008 Cochrane review, the typical antipsychotic haloperidol shows a decrease in aggression among dementia patients.<sup>11</sup> However, the extrapyramidal side effects, somnolence, and stroke risk associated with these drugs may outweigh any benefits.<sup>4,11</sup> Therefore, non-pharmacological approaches may be of benefit in this regard.

## Sensory interventions

### Multisensory environments

Snoezelen rooms (**Figure 1**) have been established in some nursing homes in Ireland as well as worldwide. These multi-sensory rooms engage the senses through fibreoptic lights, touch, colours, sound, smells, and obstacles to help engage a participant's cognitive function and perception.<sup>12,13</sup> The environment allows patients the chance to interact with staff members and helps staff to recognise what types of stimuli might provoke neuropsychiatric symptoms.<sup>12</sup>



*Figure 1: Snoezelen Rooms engage the senses through fibreoptic lights, touch, colours, sound, smells, and obstacles to help engage a participant's cognitive function and perception.*

According to Ball *et al.* (2005), even after as little as 12 hours of sensory deprivation, patients develop an acute psychotic-like state. These symptoms were not responsive to medications but improved following sensory stimulation, suggesting that stimulation via Snoezelen rooms might be effective.<sup>12</sup> However, a Cochrane systematic review performed in 2008 found that Snoezelen room sessions did not provide any effects on behaviour.<sup>13</sup> As Snoezelen rooms are expensive to implement,<sup>12,14</sup> require a great deal of staff attention,<sup>12,14</sup> and have minimal supportive evidence,<sup>15</sup> they seem to have been largely phased out in Ireland.

### Sonass Activating Potential for Communication

Sonass APC is a therapy that was developed 20 years ago in Ireland.<sup>16</sup> The programme requires participants to interact and communicate with a small group of people and incorporates a signature tune, opening and closing songs, relaxing and dance music, exercise, percussion instruments, sensory stimulation, proverbs and poetry.<sup>16</sup> People with dementia who participated in Sonass APC had improved cognitive scores, reduced depression scores, reduced activity of daily living disturbance scores and reduced communication disturbance scores compared to their baseline.<sup>16</sup> Another study trained carers in Sonass techniques. While communication between carer and patient and carer quality of life improved after six weeks, 12-week follow-up showed that the effect was not sustained.

Despite the lack of supporting evidence, Sonass APC is offered to nursing home residents across the nation and training is offered frequently in Ireland because it is inexpensive compared to similar interventions, and is readily accessible.<sup>17</sup>

### Cognitive stimulation therapy

CST is a form of mental exercise that has proven beneficial in patients with mild to moderate dementia.<sup>18,19,20</sup> It incorporates both cognitive-oriented and stimulation-oriented therapies, and

involves a wide range of mental exercises aimed at keeping the mind active and oriented as well as engaging memory through stimulation. Activities include discussion of past and present events, word games, puzzles, music and practical activities.<sup>18,19,20</sup> Granzino *et al.* (2005) found that CST improved communication skills and cognition but had no effect on anxiety, depression or activities of daily living compared to baseline.<sup>21</sup> The authors also found that the number needed to treat to garner an improvement in cognition and quality of life was comparable to those of anticholinesterase drugs.<sup>21</sup>

A Cochrane systematic review on CST found that while it improved quality of life, cognition and communication skills as is evidenced most readily by the Mini Mental State Examination (MMSE), no changes were seen in mood or self-care.<sup>19</sup>

Coen *et al.* (2011) conducted a study on the efficacy of CST on an Irish sample population in Dublin. Participants who completed CST showed increases in MMSE scores and improvements in quality of life.<sup>19,20</sup> Currently, the Irish Health Information and Quality Authority (HIQA) advocates reminiscence and reality orientation in dementia; CST makes use of the principles of reality orientation therapy and elaborates upon them.<sup>20</sup> However, it is unclear as to what extent CST is being practised in Ireland.

Providing this service for patients being cared for in the community is a challenge. One study offered carers training in reality orientation. Patients enrolled in the study were all on anticholinesterase inhibitors. Those patients whose carers took part in CST training showed an increase in both MMSE score and Alzheimer's disease assessment scores, while those whose carers were not enrolled in the training showed a decline in these scores over the 25 weeks.<sup>22</sup> Based on these findings, CST likely provides a more durable effect when implemented at home than Sonas APC.<sup>22</sup>

## Sensory therapies at home

As 63% of people with dementia live in the community,<sup>2,3</sup> therapies that can be facilitated by family members and carers must be established.

## Aromatherapy

Aromatherapy is quickly becoming a mainstay for complementary and alternative therapies.<sup>22</sup> Essential oils contain terpenes, which are absorbed through the lungs and cross the blood-brain barrier; they have cholinergic activity and act on  $\gamma$ -aminobutyric acid (GABA) receptors.<sup>4</sup> Lemon balm and lavender oil are the most widely used.<sup>22</sup> Topical application of lemon balm to a patient's face twice a day was found to reduce physical and verbal aggression, irritability and aberrant behaviour compared to those who were treated with a placebo.<sup>24</sup> The effects of lavender oil on behaviour were observed when diffusers were placed on either side of a patient for an hour during sleep.<sup>25</sup> A significant reduction was seen in agitation and improvements were seen in night-time waking.<sup>25</sup> Touch and massage can also be incorporated with aromatherapy to enhance its effects. They provide a reassuring, non-verbal form of communication and are believed to stimulate oxytocin release and

activate memories.<sup>24</sup> When compared to those who received regular oil massage or aromatherapy alone, dementia patients who received aromatherapy massage yielded the strongest decline in agitated behaviour.<sup>25</sup>

Fung *et al.* (2012) performed a meta-analysis that explored the effects of aromatherapy in dementia. This showed that aromatherapy improves cognitive functioning and decreases the frequency of neuropsychiatric symptoms.<sup>26</sup> While the review made use of one study (Burns *et al.*, 2011) that looked at the effects of aromatherapy in home-based practice, the study lacks power.<sup>26</sup> Therefore, further investigation is required before recommending it to carers.

## Music therapy

Both musical ability and listening to music have an effect on steroid hormones.<sup>27</sup> Oestrogen and testosterone decrease  $\beta$ -amyloid, a pathological finding in Alzheimer's disease, as well as having other neuroprotective effects against dementia disease processes.<sup>27</sup> Fukui *et al.* (2012) investigated the effects of music and music therapy on 17  $\beta$ -oestradiol concentrations and testosterone concentration. Therapy consists of discussing health and emotion while music entails listening to favourite songs. Music therapy incorporates aspects of both music and therapy sessions. Both music and music therapy increased 17  $\beta$ -oestradiol concentrations but music therapy was the only intervention that yielded a significant increase in testosterone levels. Carers additionally reported a decrease in problematic behaviour that lasted for 24 hours after the music therapy session.<sup>27</sup> Given the protective effect of testosterone and oestrogen, these findings might suggest that music therapy has the potential to slow disease progress in Alzheimer's disease as well as reducing neuropsychiatric symptoms.<sup>27</sup>

Music therapy can also be used by carers to reduce agitation and apathy.<sup>7</sup> Live music has the greatest effect on positive engagement and apathy reduction; however, it might not always be a feasible option in community care.<sup>7</sup> Playing a patient's favourite prerecorded songs has immediate effects on present agitation but is not found to have long-term ones.<sup>7</sup>

## Discussion and conclusions

Non-pharmacological sensory approaches to dementia may help in the prevention of neuropsychiatric symptoms. They are also not accompanied by the troublesome side-effects of pharmacological agents. Sonas APC, CST, aromatherapy and music therapy, especially, demonstrated favourable effects on neuropsychiatric symptoms, reducing aggression and improving quality of life. However, while current results are promising, larger trials, more stringent protocols and comparisons to the current mainstay pharmacological treatments are necessary to ensure the efficacy of these approaches. Given the current state of evidence, sensory approaches to dementia can, at best, be recommended as adjuvants to the current standard of pharmacological and behavioural therapy. Despite the lack of conclusive literature, the 2011 NICE guideline recommends cognitive stimulation, multisensory stimulation, music therapy, aromatherapy and massage.<sup>6</sup> Central to these

recommendations is the focus on patient-centred management based on preferences and skills. All interventions should be carefully monitored and adapted based on the patient's growing and evolving needs. Therefore, despite the lack of substantial evidence, the use of sensory-based therapy methods in dementia might be considered on a patient-by-patient basis.

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