



# PROMOTING THE WELL-BEING OF OLDER ADULTS THROUGH MULTI-SENSORY ENVIRONMENTS

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## ***Introduction***

The rapidly growing elderly population brings new health care issues into sharp focus, particularly that of caring for elders with neurologic and cognitive deficits related to dementia. Research over the past two decades has identified that agitation is a persistent characteristic of all dementias and is the leading cause of decreased quality of life for both the older adults and the caregivers who are caring for them (Cohen-Mansfield, 2001). This is mainly due to the fact that if left untreated, agitation in dementia can spiral into a major panic attack termed as a catastrophic reaction (CR). At this point the older adult is out of control and exhibiting behaviors harmful to themselves and others. Research has shown that CR can lead to declines in both physical and psychosocial functioning of the person with dementia, and also increases caregiver burden ten fold. A study conducted by Souder and O'Sullivan (2003) concluded that on average, caregivers spent approximately 23 minutes managing each episode of agitation exhibited by a patient with dementia. Caring for elders with dementia is psy-

chologically demanding, and can result in psychiatric symptoms of caregiver “burnout” (Rosenblatt, 2005). The loss of skilled health care providers will undoubtedly be felt in the often short-staffed world of long-term care. The increasing dementia care costs will have a staggering effect upon the nation’s economy, care facilities, and families alike unless more efficient methods of early detection of agitation in dementia agitation measurement and management is implemented to aid nursing staff in their efforts.

### *Understanding How Agitation in Dementia Begins*

In general there is little consistency in the definition of agitation in dementia. Early research postulates that it is probably a result from a combination of needs and confusion; however, these needs are usually not evident. Most investigators agree that behaviors of agitation are observable and are usually repetitive vocal or non-vocal in nature. Early and accurate detection of dementia agitation (DA) is often difficult since the person with dementia can not appropriately express their needs to their caregivers as a result of their dementia-related cognitive impairment, thus agitation in dementia is typically identified through direct observation only after the behaviors have already started. Nurses follow a popular model of care when working with persons with dementia and agitation. This model is called the Need-Driven Dementia-Compromised Behavior Model (NDB) (Algase et al, 1996). This model views agitation in dementia as a symptom the patient displays in an attempt to communicate physical or psychic needs that are not being met through personal or caregiver intervention (Algase et al, 1996; Kovac et al, 2005). The NBD model integrates the antecedents from the pathophysiological, psycho-behavioral, and environmental perspectives to explain agitated behavior as a symptom of an unmet need. Following the direction from this model, nurses, therefore, must first assess any physical, psy-

chosocial, or environmental factors that may be causing the agitation, then direct their intervention to alleviating the causative factors before the symptoms of agitation erupt. This requires early detection and accurate measurement of anxiety and agitation.

### ***Multisensory Environments to Mitigate Symptoms of Agitation***

MSE was first introduced in Europe as a therapeutic method for stimulating the primary senses of touch, hearing, sight, smell, and taste in children with mental disabilities. The similarities between the care for people with dementia and those with learning disabilities led to the expansion of MSE therapy into dementia care. Recent studies have indicated that providing a multi-sensory experience, such as in multi-sensory environments (MSE), has produced a calming effect for dementia patients [Riley-Doucet, 2006,] and has benefit in increasing the intercommunication between the patient and caregiver (Riley-Doucet, 2007).



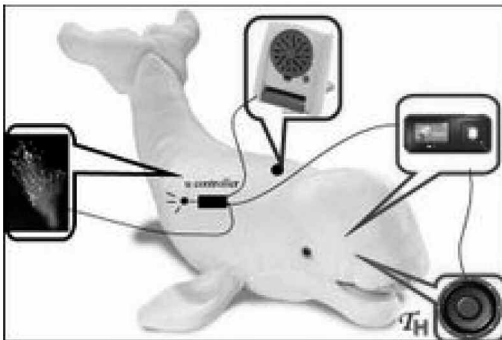
*Figure 1. MSE equipment*

MSE are designed to gently stimulate all senses at the same time while the patient relaxes (Hope, 1998), and promote alertness in a patient without being intellectually challenging or alarming (VanWeert & VanDulmen, 2005). The stimuli typically used in MSE are music, light stimuli, bubble tubes, message/vibration, heat, aroma therapy, and soft objects to touch. Figure 1 depicts an example of MSE equipment.

## *Current Research*

In an attempt to fill a gap in biomedical technology that aids nursing staff with methods for detecting the onset of agitation and managing anxiety that leads to agitation in older adults with dementia, the Portable Automated Multi-sensory Intervention Device (PAMID) was developed by a team of interdisciplinary researchers from the School of Nursing and the Computer Science and Engineering Department at Oakland University, Michigan (Riley-Doucet, Elhajj, Mills, Church, & Knapp, 2007). PAMID is an automated system that is intended to quantify anxiety which would lead to agitation by measuring physiological signals such as changes in heart rate, body temperature, and electro-dermal response. It also is designed to provide a multi-sensory environment for the patient by emitting multi-sensory stimuli that have been shown to reduce anxiety that leads to agitation in persons with dementia. PAMID resembles a soft and white stuffed whale and is made up of two basic units of function. The first is a sensing unit that is designed to detect physiological responses of anxiety in subjects accompanying the device. The sensing unit is wirelessly connected to the stimulation unit and to a computer that monitors physiological signals. The second is the stimulation unit where multi-sensory stimuli are set to initiate once anxiety is detected in the older adult. The multi-sensory stimuli include music, aromatherapy, message, heat and light stimulus through colorful fiber optic lighting.

Figure 2 depicts the PAMID prototype.



*Figure 2. PAMID prototype*

The current research which started in May 2007 is focused on refining the construction of PAMID and testing its functionality with healthy subjects in a laboratory setting. During the past fall semester, researchers Dr. Cheryl Riley-Doucet and Dr. Debatosh Debnath and four undergraduate and graduate student research assistants tested the accuracy of PAMID in detecting induced anxiety on a sample of 100 students for Oakland University. A detail set of data from the subjects and PAMID were collected, and is currently being analyzed in order to improve PAMID. This data will also be used as preliminary data toward an NIH grant submission in February 2008 which is aimed at moving this research to clinical trials.

The development of automated monitoring and response systems will become increasingly valuable as the patient to caregiver ratio grows steadily in the coming decades. Our system quantifies anxiety that may lead to agitation by measuring physiological signals and provides multi-sensory stimuli that research has shown to reduce agitation in patients with dementia. The overall aim of the current research is to produce a health care innovation that will ultimately assist nurses and other health care professionals in their care for patients with dementia and agitation.

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