



Noise

Part 2 - Social Design Interventions

This document is geared towards persons caring for or working with seniors

Environmental factors affect noise and noise affects behaviour. The evidence is clear and compelling that unwanted and excessive noise increases stress which in turn has health impacts such as higher anxiety and confusion, increased heart rate, blood pressure and fatigue (1-3), delayed wound healing, decreased weight gain (4), impaired immune function (5) and impaired hearing (6). **The effect of noise on medical and behavioural health is magnified for a person with dementia.** While there may be an assumption that good noise hygiene is a common courtesy in any living environment, many environments for persons with dementia (PWDs) can be impacted by the fact that they are also work environments.

Noise by definition is obtrusive or interferes with listening whereas quality of sound is subjective to individuals -- regardless of dementia. The following recommendations will primarily focus on intrusive noise--from a point of care and behaviour perspective-- that can affect quality of life (7-8). These recommendations involve point of care interventions that can be implemented by those interacting with PWDs. These recommendations will aim to encourage staff, caregivers and others working with persons with dementia to minimize certain types and duration of stressful or intrusive noise. Addressing noise sensitivity does not mean eliminating all noise (this can lead to under-stimulation), rather providing the right kinds of noise at the right level at the right time (9).

> Noise can cause discomfort and can trigger responsive behaviours
> Acceptable noise levels are subjective and can vary daily between individuals and in different contexts



Appropriate Noise and Positive Sound

RECOMMENDATION:

Encourage appropriate noise and positive sound when possible

WHY? For some people, omitting noise altogether can lead to under stimulation; using positive, calming or uplifting sounds such as gentle music or nature sounds will encourage and promote engagement.

Strategies:

- Provide positive sound experiences through individualized programming. Continuously audit positive sound and change positive sound experience for variety
- Decrease meaningless noise as much as possible and be mindful of noise generated by staff (11)
- Consider a commercial masking noise system (10) to minimize other intrusive noises (e.g. which can be programmed to change level of intensity dependant on time of day) (see table for sound masking levels)
- Use positive sounds such as music which is appropriate for age/ culture/ faith/ language.
- Ensure noise levels do not exceed guidelines (14, see table)
- Consider and balance the needs of PWDs with other persons with and without hearing loss both in activity (television) and safety (fire alerting device)
- Develop lists of bothersome noises for each person (1)
- Turn off the television / radio when not being used (12)
- Use music therapy and positive stimulation sounds when appropriate (e.g. multi-sensory space) (13, 14)

Communication Techniques

RECOMMENDATION:

Ensure all staff understand environmental factors that contribute to intrusive noise and implement dementia-specific communication strategies when interacting with PWDs

WHY? Communication becomes increasingly difficult for PWDs. Unclear messages coupled with intrusive noise can cause anxiety and agitation.

Strategies:

- Use less vocalization and more gestures and/or facial expressions to assist PWDs to understand the message or request being conveyed (15)
- Use normal/low tone of voice and patterns of "turn-taking" Particularly for the hard of hearing, speak slowly, clearly and in an even tone (i.e. avoid dropping off in loudness at the end of a word or sentence) (16)
- Consider using The Canadian Hearing Society Unfair Hearing Test: An Interactive Listening Experience for education (17)
- Staff should not shout to each other across rooms or at people
- Set routines and reminders to wear hearing aids and check batteries
- Engage PWDs in meaningful activities in small groups and small rooms by using clear, resident-centred communication to promote understanding (18)
- Use simple, language-specific and culturally-relevant statements
- Decrease background noise

Resident Sensory Assessment and Accommodation

RECOMMENDATION:

Regularly assess and accommodates for vision and hearing loss of persons with dementia

WHY? Audio function is impaired in people with dementia and poor hearing is known to exaggerate the effects of cognitive deficits 18). Assessing and optimizing PWD's ability to perceive and understand their environment increases opportunity for social engagement.

NOTE: Refer to lighting document for complementary recommendations.

NOTE: Hearing aids do not improve hearing, they amplify all noise. Sounds become louder but not clearer (See Unfair Hearing Test, 19).

NOTE: While hearing aids do not improve cognitive function or reduce behavioural or psychiatric symptoms, there is evidence that they do reduce disability caused by hearing impairment and that PWDs improve on global measures of change (20).

Strategies:

- Ensure hearing assessments are available and referrals are made for PWDs (9,20,21)
- Arrange formal hearing tests as early in the dementia as possible to enhance learning and comfort level with using a hearing aid (9,20,21)
- Encourage use and maintenance of hearing aids (including regular battery replacement) (9,20,21)
- Reduce background noise to enhance hearing aid compliance (9,20,21)
- Monitor for earwax build-up. Removal of earwax can lead to significant hearing improvement in 10% of patients presenting with hearing loss (9,20,21)
- Ensure adequate lighting, and appropriate communication techniques to enhance hearing and decrease noise-related frustration, anxiety and/or paranoia (e.g., adequate light on your face when speaking) (9,20,21)
- Gesture and use visual cueing versus shouting. Raising one's voice will distort the speech signal (9,20,21)
- Make hearing amplifiers (e.g. pocket talkers) available for use by PWDs who will not wear a hearing aid (9,20,21)
- Include information on effective sensory assessment in all training (e.g. offer in-services on the use of hearing aids, use the Canadian Hearing Society as a resource)

Monitoring Distress

RECOMMENDATION:

Regularly assess the effect of noise levels on PWDs and make efforts to counter any distress by reducing intrusive noise

WHY? High noise levels can lead to behavioural and physical stress reactions such as anxiety, confusion, increased heart rate, blood pressure, and fatigue from over stimulation. Noise can be associated with sleep disturbance, reduced ability to perform tasks, and agitation (1-3).

Strategies:

- All staff, volunteers and family monitor noise-related distress by observing the facial reactions (22), body language and behaviours of PWDs
- Where necessary, reduce intrusive noise / introduce positive sound

Do you have design considerations to suggest? Please send us your feedback by visiting the AKE website and submitting your questions and / or comments to the Design and Dementia Knowledge to Practice Recommendations Online Feedback Form located in the Design and Dementia Community of Practice web page: www.akeresourcecentre.org/Design

4 Decibel Levels Associated with Selected Sounds (10, 7,23)

Effect	Decibel (dB)	Source
Physical Effect (direct damage)	130-150	Jet engine at takeoff, amplified music
	120-140	Gunshot, siren at 100 feet * Threshold of pain
Physiological Effect	110-120	Chainsaw, jackhammer, snowmobile, rock concert
	90-100	Lawn mower, tractor, farm equipment
	90	USA Occupational Health & Safety workplace limit (Hearing damage may occur)
	75-85	Radio, vacuum cleaner, heavy traffic
	60	Normal conversation
Psychological Effect	47	**Commercial Masking Noise System
	40-50	Rustling leaves, soft music, residential area at night
	30	Whisper
	15	Threshold of hearing
	0	Weakest sound

References Cited

- Overman-Dube, J. A., Barth, M., Cmiel, C., Cutshall, S., Olson, S. et al. (2008) Environmental Noise Sources and Interventions to Minimize Them: A Tale of 2 Hospitals. *Journal of Nursing Care Quality*, 23(3), 216-224.
- O'Keefe, J. (ND). *Creating a Senior Friendly Physical Environment in our Hospitals*. Regional Geriatric Assessment Program of Ottawa. Retrieved from: <http://www.rgpeo.com/documents/Senior-friendly-fulltext2.pdf>
- Devlin, A.S. & Arneill, A.B. (2003). Health care environments and patient outcomes: A review of the literature. *Environment and Behavior*, 35(5), 665-694 doi: 10.1177/0013916503255102
- Wysocki, A.B. (1996). The effect of intermittent noise exposure on wound healing. *Advanced Wound Care*. 9, 35–39.
- Redwine L., Hauger, R.L., Gillin, J.C. & Irwin, M. (2000) Effects of sleep and sleep deprivation on interleukin-6, growth hormone, cortisol, and melatonin levels in humans. *J Clin Endocrinol Metab*, 85, 3597–3603.
- National Institute of Health (NIH) Consensus Statement Online (1990) *Noise and hearing loss*. Retrieved from: <http://www.ncbi.nlm.nih.gov/books/NBK15162/>
- Brawley, E. (2006). *Design innovations for aging and Alzheimer's: Creating caring environments*. John Wiley and Sons Inc.: New Jersey.
- Schlanger, H. (2008). *Measuring Sound Intensity and Loudness: Adopting the Decibel Scale to Objectively Measure Sound*. Retrieved from: <http://www.suite101.com/content/how-loud-is-it-a62825>
- Croucher, M. (2009). *Why are some people with dementia more sensitive to noise than they were previously?* Retrieved from: <http://www.alzcanty.co.nz/content/view/86/45/>
- From http://en.wikipedia.org/wiki/Sound_masking
- Van Hoof, J., & Kort, H. (2009). Supportive living environments: a first concept of a dwelling designed for older adults with dementia. *Dementia*, 8(2), 293-316.
- Malott, O. (2000). *Alzheimer Resource Manual*. Murray Alzheimer Research and Education Program, University of Waterloo. Waterloo, Canada. <http://www.marep.uwaterloo.ca/products/arm.html>
- Canadian Coalition for Seniors' Mental Health, (2009). *Mental Health Issues in LTC*
- 3rd Canadian Consensus Conference on Diagnosis and Treatment of Dementia (2007)
- Camp, C. (1999). *Montessori-Based Activities for Persons with Dementia, Volume 1*. Menorah Park Center for Senior Living. Health Professions
- Swallow, (2010) Personal Communication
- Canadian Hard of Hearing Association. *Canadian Un-Fair hearing test*. Retrieved from <http://www.youtube.com/watch?v=xzUJwgCZ1Gc&feature=related>
- MAREP, *Managing and accommodating responsive behaviours in dementia care*.
- Canadian Hard of Hearing Association, *Unfair Hearing test* Retrieved from <http://www.youtube.com/watch?v=xzUJwgCZ1Gc>
- Allen, H., Burns, A., Newton, V., Hickson, F., Ramsden, R., Rogers, et al. (2003). The effects of improving hearing in dementia. *Age and Aging*, 32(2), 189 – 193.
- Adams, T. & Manthorpe, J. (2003) Age and opportunity. *Nurs Older People*, 15(9). 32-33
- Wong, D., Hockenberry-Eaton, M., Wilson, D. Winkelstein, M.L. & Schwartz, P. (2001). *Wong's essentials of pediatric nursing* (6th ed.). St. Louis
- McClagherty, L. & Gibson, C.N. (1998). Sounds of the nursing facility: The sound of music? *Consultant Pharmacist*. <http://www.ascp.com/publications/tcp/1998/nov/sounds.shtml>

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The Alzheimer Knowledge Exchange Design and Dementia Community of Practice is pleased to share the following Dementia-Friendly Design Recommendations focusing on **NOISE**. This is the **third in a series of dementia friendly design consideration documents** that, with permission, have been adapted and build upon both the foundational work and senior friendly hospital audit tool developed by **Regional Geriatric Program of Eastern Ontario**. Visit the Alzheimer Knowledge Exchange website (www.akeresourcecentre.org) for a listing of the Design and Dementia Community of Practice core workgroup.

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DEMENTIA-Friendly Design Considerations is a series of 'Knowledge to Practice Recommendations' related to important physical design elements to facilitate the process of persons with dementia and their caregivers to make sense of their environment and improve well-being. The Knowledge to Practice Recommendations are living or dynamic documents which will be continually edited and updated by the AKE Design and Dementia Community of Practice based on emerging quality evidence and the integration of both practice-based and experiential knowledge of those caring for persons with dementia.