



Approaching Knowledge, Attitudes, and Practices Model for Elderly with Dementia Who are Suspected to Have Hearing Impairment in Korea

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Because the psychophysical symptoms of hearing loss and dementia in the elderly are very similar, untrained healthcare professionals in dementia facilities can easily overlook a severity of hearing loss in their patients. The present study identifies their knowledge, attitudes, and practices (KAP) on hearing loss using a survey whether they may help hearing problem of the patients with dementia. A total of 29 health-care professionals responded to the KAP survey. Also, 2 family members participated. The results showed that most of the nurses and caregivers in elderly medical welfare facilities who worked with dementia patients did not have knowledge of their hearing loss. Even the facility managers did not know how to conduct hearing tests for their patients although they did recognize that some of their patients had a hearing loss. Eventually, actual practice was not possible at this moment by the professionals. However, our respondents did have a positive attitude toward screening for hearing loss and help their patients with dementia wear hearing aids if a clinical guideline was provided. We suggest to develop clear and precise clinical guidelines of the hearing screening test for the dementia patients due to the interrelationship between dementia and hearing loss. When these guidelines apply to elderly residents in a medical welfare facility, early diagnosis and treatment of their sensory loss will help alleviate their dementia as well.

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Introduction

Since improved surgical procedures and treatment techniques have made it possible to overcome various maladies, the human life span has been extended; thus, the number of older adults is increasing globally. South Korea is also showing the same unprecedented rapid aging trend. According to the report by Korean Statistical Information Service, its ratio of elderly population will reach 20% of total population in 2025, making Korea a super-aged society [1]. Thus, common chronic diseases of the elderly are currently considered carefully at the government level, along with a need for better care

of the elderly.

The elderly with dementia is globally estimated at 35.6 million as of 2012 and forecast to triple by 2050 [2]. Given that new attention, there is strong evidence that the degraded functioning of aging sensory systems may be associated with cognitive decline in the elderly. Contemporary researchers have thus investigated the relationship between hearing and/or vision impairments of old adults and cognitive dysfunction. As examples, we summarize here eight well-designed studies [3-10] in Table 1. Although the methodology applying for functional and dysfunctional measurements of the sensory and cognitive systems were slightly different across these studies [3-5,9], all concluded that either hearing or vision loss in the older population could fatally affect any dementia. In particular, the symptoms caused by untreated hearing loss showed very similar tendencies for worsening cognitive decline or

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Table 1. Summary of eight published papers showing the relationship between hearing and/or vision impairment and dementia (or cognitive decline)

Researcher (year) /Research type	Sample	Assessments	Key findings
Uhlmann, et al. [10] (1991)/Case-control study	n=174 (each of 87 of cases and a control who had AD and were nondemented, age ≥65)	<ul style="list-style-type: none"> Visual acuity was measured using the Snellen and Rosenbaum method for far and near vision. Pure tone audiometry was performed for measuring hearing ability. The MMSE score was used as an indicator of cognitive functioning in separate analyses of demented patients. 	<ul style="list-style-type: none"> The degree of VI significantly correlated with the severity of cognitive dysfunction for both near and far vision. VI is associated with both an increased risk and an increased clinical severity of AD, but that increased risk may not be consistent with a progressive dose-response relationship.
Lin, et al. [6] (2004)/Prospective cohort study	n=6,112 of women (aged ≥ 69)	<ul style="list-style-type: none"> VI was defined as corrected vision worse than 20/40. HL was defined as the inability to hear a tone of 40 dB or greater at 2 kHz. Cognitive and functional decline was defined as 3MS per the National Health Interview Survey Supplement on Aging. 	<ul style="list-style-type: none"> A twofold increase in the odds of cognitive and functional decline over time was associated with vision impairment. A trend toward increased odds of cognitive impairment for those with hearing loss at baseline was identified. Sensory impairment was associated with cognitive and functional decline in older women.
Reyes-Ortiz, et al. [8] (2005)/Prospective cohort study	n=2,140 of Mexican Americans (age ≥65)	<ul style="list-style-type: none"> Cognitive function decline was assessed using the MMSE-blind at baseline and at 2, 5, 7 years' follow-up. Visual acuity was measured during an in-home interview. Hearing was assessed by the HHLE. 	<ul style="list-style-type: none"> Near vision impairment was predictive of cognitive decline in older Mexican Americans independently of other health factors.
Lin [4] (2011)/ Cross-sectional research	n=605 (ages 60–69 year)	<ul style="list-style-type: none"> HL was defined as the pure-tone average of hearing thresholds. Cognitive function was defined by the DSST. 	<ul style="list-style-type: none"> Greater HL was significantly associated with a lower score on the DSST. The reduction in cognitive performance associated with a 25 dB HL was equivalent to the reduction associated with an age difference of 6 years. HL is independently associated with lower scores on the DSST.
Lin, et al. [5] (2011)/ Original contribution research	n=639 (ages 36–90 year)	<ul style="list-style-type: none"> HL was defined by a PTA at 0.5–4 kHz. Incident dementia was diagnosed by a multi-disciplinary consensus diagnostic conference with the standard. 	<ul style="list-style-type: none"> The risk of incident all-cause dementia increases loglinearly with the severity of baseline hearing loss. Hearing loss is independently associated with incident all-cause dementia.
Ong, et al. [7] (2012)/ Cross-sectional study	n=1,179 (ages 60–80 year)	<ul style="list-style-type: none"> Visual acuity was measured using the logMAR number chart. The Abbreviated Mental Test derived from the Hookinson Test was used for cognitive function measurement. Additionally, the major age-related eye diseases (cataracts, glaucoma, diabetic retinopathy, age-related macular degeneration) were considered to be factors for cognitive decline. 	<ul style="list-style-type: none"> Older persons with visual impairment, particularly those with visual impairment due to cataracts, are more likely to have cognitive dysfunction. Of the major age-related eye diseases, only diabetic retinopathy was associated with cognitive dysfunction.

Table 1. Summary of eight published papers showing the relationship between hearing and/or vision impairment and dementia (or cognitive decline) (continued)

Researcher (year) /Research type	Sample	Assessments	Key findings
Gurgel, et al. [3] (2014)/ Longitudinal cohort research	n=4,463 of the elderly (ages ≥65)	<ul style="list-style-type: none"> • 3MS-R was used for a cognitive function comparison. • HL at baseline was based on observation of hearing difficulties during testing or an interview. 	<ul style="list-style-type: none"> • HL subjects have a higher rate of developing dementia and have more rapid decline than non-HL subjects. • HL was shown to be an independent predictor for developing dementia. • HL may be a marker for cognitive dysfunction in those 65 years (and older) elderly individuals.
Thomson, et al. [9] (2017)/ Systematic review	n=200–1,338,462	<ul style="list-style-type: none"> • 17 studies relating HL to dementia or cognitive decline were analyzed. • The results of the studies were evaluated to determine hearing loss and cognitive status, relevant covariates and confounding factors, and a key finding. 	<ul style="list-style-type: none"> • Although the studies utilized slightly different methods to evaluate the participants, each study demonstrated that hearing loss is associated with a higher incidence of dementia in older adults.

AD: Alzheimer's disease, VI: vision (or visual) impairment, MMSE: mini-mental state examinations, HL: hearing loss, 3MS: modified mini-mental state examinations, HHIE: hearing handicap inventory for the elderly, DSST: digit symbol substitution test, PTA: pure tone audiometry average, 3MS-R: modified mini-mental state examinations-revised

dementia, while limiting social activity and producing isolation, depression, a lower quality of life, and reduced mental well-being overall [11,12].

Although each case of hearing loss and cognitive impairment can have a different characteristic due to the different sites of the lesion, i.e., the ear and brain, respectively, Fig. 1 demonstrates that the two diseases share many common psychophysical symptoms, including a lower quality of life, communication disability, social isolation, depression, and more. In other words, any patient who suffers from both dementia and hearing loss, the symptoms of hearing loss may be confusable or covered up as part of the cognitive impairment, thereby resulting in their hearing system remaining untreated. When considering the increased risks for dementia and the significant negative impact of comorbidity of two diseases on the mental well-being of the elderly, it becomes even more necessary to clinically evaluate the hearing loss in dementia patients.

On the other hand, the Knowledge, Attitudes, and Practices (KAP) survey is a representative tool used for a specific population to collect information on what is known, believed,

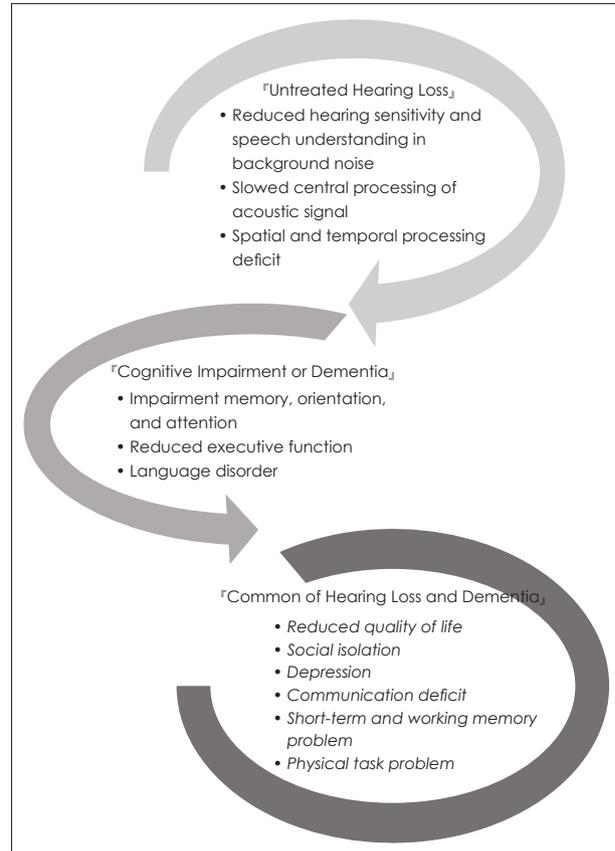


Fig. 1. Clinical and subclinical symptoms for older adults who suffer from untreated hearing impairment (top) and dementia (middle). Their common features resulting from less care by the health care professionals in their facility (bottom).

and done in relation to a specific field. Historically, the KAP model was developed for family planning and population studies in the 1950s, with its purpose being to measure the extent to which any clear opposition to the notion and organization of family planning existed among different populations, so specific family planning practices could be used for different program purposes worldwide. In the 1960s and 1970s, the number of studies on community perspectives and human behavior grew rapidly in response to the needs of the primary health care approach that was adopted by international aid organizations [13]. Since that time, these KAP surveys had been used to investigate health behavior and continued to be widely used to gain information on health-seeking practices. Based on the KAP model, knowledge affects attitude and practice directly, and attitude will also directly affect actual practice or intentions [14]. In other words, three factors were related and thus considered together.

This brief communication identifies KAP on hearing loss of the health-care professionals in the elderly medical welfare facilities, while using a questionnaire based on that KAP model. Also, as an early stage of approach, we discuss what can be provide for them and their patients by hearing professionals in Korea

Subjects and Methods

Survey items

To develop the Korean version of KAP (K-KAP) survey, a questionnaire was adapted [15] with both translation and back-translation from English to Korean by a professional translator, and inappropriate questions related to the Korean health system were modified (i.e., the residential aged care setting in the original version of the KAP survey was modified to be an elderly medical welfare facility and long-term hospitalized facility). The final version of the questionnaire was consulted on and confirmed by professors with long careers in the Audiology and Nursing fields.

The K-KAP survey consisted of four target populations for each version: 1) Facility Manager (46 questions), 2) Nurses and Allied Health Professionals (25 questions), 3) Caregivers (25 questions), and 4) Family Members of Patients (19 questions). The version for facility workers (1 to 3) investigated three aspects of knowledge, attitudes, and practices- related sensory impairments for dementia, while the version of family members included several questions about sensory loss of their patients at the facility. Each version of the questionnaire had the same purpose, but it was slightly different in terms of its scope of gathered information. For example, the version for the facility manager included questions on whether employ-

ees were educated for related sensory impairment for patients with dementia, how to reflect support of the management plan, and more. The version for the nurses and allied health professionals and caregivers included questions on whether they had received education about sensory loss and the interpretation of results of screening tests. In other words, the questionnaire was systematically structured in terms of each participant's position and related circumstances.

Participants

Before extending in a larger scale study in Korea, participants were randomly contacted to two facilities, one for Namyangju city and the other for Chuncheon city in easy accessibility and short duration of the pilot study. The target participants consisted of four groups' working at legally designated 'elderly medical welfare facilities' and a 'long-term hospitalized facility (in Korea, the elderly medical welfare facility provides nursing and assisting other daily life for the elderly, whereas the long-term hospitalized facility has a similar service except for professional medical services to patients by doctors and nurses)' in Korea and these facility patients' family member.

For the sample data, a total of 31 subjects completed a questionnaire with a sufficient explanation of its purpose and method. The respondents consisted of 4 facility managers, 5 nurses and allied health professionals, 20 caregivers, and 2 family members of patients. Detailed information on the respondents is included in Table 2.

All procedures for the present study were approved by Hallym University's Institutional Review Board (HIRB-2018-065) and the participants were asked to sign an informed consent before they completed the questionnaire.

Results

Facility managers

Five facility managers who have worked for nearly two years responded and recognized that a number of the dementia patients with sensory loss and the degree of their loss (4 out of 5). However, none responded and indicated they know how to screen for difficulty of hearing or vision for their patients. In terms of attitude, three out of five managers were able to test the hearing or vision when provided with specific clinical guidelines (or a program manual) and screen their patients' sensory systems. Although most of the managers did not know the guidelines well, they were positive about monitoring the hearing or vision conditions of their patients and recognized it was as necessity. Nevertheless, current situation indicated that there was no facility or staff training on doing hearing and/or vision tests as a typical practice.

Table 2. Demographic information on study subjects (n=31)

Questions	Response	Facility manager	Nurse and allied		
			health care professionals	Caregiver	Family members
Gender	Male	1	0	4 (20)	0
	Female	4 (100)	4 (100)	16 (80)	2 (100)
	Total	5	4	20	2
Ethnic or cultural background	Korean	5 (100)	4 (100)	20 (100)	2 (100)
	Others	0	0	0	0
	Total	0	4	20	2
Job title	Facility manager or deputy service manager	1 (20)	0	0	
	Nurse	0	0	0	
	Practical nurse	0	3 (75)	0	
	Caregiver (care assistant, caregiver, etc.)	1 (20)	0	20 (100)	
	Allied health professional	0	1 (25)	0	
	Others	3 (60)	0	0	
	Total	5	4	20	
Years in profession	2 years or less	3 (60)	3 (75)	10 (50)	
	2–5 years	1 (20)	1 (25)	4 (20)	
	5–10 years	1 (20)	0	6 (30)	
	10 years or more	0	0	0	
	Total	5	4	20	
Professional qualifications	Graduate school graduation	0	0	0	
	University graduation	3 (60)	1 (25)	1 (5)	
	College graduation (or equivalent)	1 (20)	1 (25)	2 (10)	
	High school graduation	1 (20)	2 (50)	13 (65)	
	Middle school graduation	0	0	3 (15)	
	No academic background	0	0	0	
	Other qualifications	0	0	0	
	No response	0	-	1 (5)	
Total	5	4	20		

Values are presented as n (%).

Nursing and allied health staff

Table 3 displays the responses from 4 nurse and allied health care professionals and 20 caregivers on their knowledge. Although 3 out of 4 nurses partially knew their patients had hearing or vision loss and the way to use to refer them to professionals, they could not conduct simple testing (100%) and also not interpret the results (75%) due to a lack of training and/or knowledge. Thus, they also reported having less confidence in handling assistive devices for hearing and vision. Compared to the responses of the nurses, the answers of caregivers were less knowledgeable and seemed negative.

Regarding attitudes on the KAP survey (Table 4), the respondents partially agreed with conducting screen tests for hearing or vision. In particular, the caregivers wanted more guidance about the clinical guidelines. Also 80% of the caregivers reported that their patients with dementia might actually use hearing aids effectively. In Table 5, our respondents report that most did not test or check the assistive devices of

hearing and vision, such as hearing aids and spectacles, while also having no opportunity to be educated or training. There was no specialized staff to care the hearing or vision loss for their patients.

Family members

Although there was a very small sample size, family members also reported that they knew their mothers had a hearing loss, but they did not try to ask for hearing screening or care or hearing aids for her because the staffs at the facility were untrained.

Conclusions and Further Implication

The present study surveyed KAP of staffs in the aged care facility and of family members of residents towards hearing and identified any feasibility of K-KAP survey to find any relation of three factors. The current pilot data showed that

most respondents who were nurses and caregivers in the elderly medical welfare facility and had worked for dementia patients did not have any/enough knowledge of the hearing

loss of the elderly. Even the facility managers did not know about how to conduct hearing tests for their patients although they did realize that some of their patients had hearing loss.

Table 3. Sample results for knowledge section gathered from nurse and allied health care professionals (n=4) and caregiver (n=20)

Item number	Response	Nurse and allied health care professional	Caregiver
Q1. I know which residents with dementia have a hearing impairment, and use a hearing aid or other aids.	Strongly agree	0	3 (15)
	Agree	1 (25)	6 (30)
	Neutral	3 (75)	7 (35)
	Disagree	0	4 (20)
	Strongly disagree	0	0
	Total	4	20
Q3. I am aware of brief hearing/vision tests that could be used for residents with dementia.	Strongly agree	0	2 (10)
	Agree	0	3 (15)
	Neutral	0	5 (25)
	Disagree	4 (100)	10 (50)
	Strongly disagree	0	0
	Total	4	20
Q4. I have the training and expertise to administer a brief hearing/vision test and interpret the results.	Strongly agree	0	2 (10)
	Agree	0	1 (5)
	Neutral	0	5 (25)
	Disagree	3 (75)	8 (40)
	Strongly disagree	1 (25)	4 (20)
	Total	4	20
Q5. I am aware of, and would be able to use, appropriate referral pathways for any patients who failed a brief hearing/vision screen.	Strongly agree	0	0
	Agree	0	4 (20)
	Neutral	3 (75)	7 (35)
	Disagree	0	8 (40)
	Strongly disagree	1 (25)	1 (5)
	Total	4	20
Q6. I know how to incorporate hearing/vision support needs in ongoing management plans.	Strongly agree	0	0
	Agree	0	4 (20)
	Neutral	1 (25)	5 (25)
	Disagree	2 (50)	10 (50)
	Strongly disagree	1 (25)	1 (5)
	Total	4	20
Q7. I am confident about helping residents with dementia to use assistive hearing devices, including hearing aids and TV amplifiers.	Strongly agree	0	0
	Agree	0	6 (30)
	Neutral	3 (75)	13 (65)
	Disagree	0	0
	Strongly disagree	0	1 (5)
	No response	1 (25)	-
	Total	4	20
Q7-1. If you are not confident in helping residents with dementia us assistive hearing devices, what specific difficulties do you have?	Lack of training on use/maintenance	0	3 (15)
	Lack of knowledge (hearing aid on/off)	1 (25)	0
	Checking procedure to see if working	0	0
	Changing batteries	0	0
	Checking/cleaning for wax	0	2 (10)
	Other	0	2 (10)
	No response	3 (75)	13 (65)
	Total	4	20

Values are presented as n (%). TV: television

Table 4. Sample results from the attitude section for nurse and allied health care professionals (n=4) and caregivers (n=20)

Item number	Response	Nurse and allied health care professional	Caregiver
Q1. A brief hearing/vision screen would be acceptable for residents with dementia.	Strongly agree	1 (25)	0
	Agree	1 (25)	8 (40)
	Neutral	2 (50)	9 (45)
	Disagree	0	3 (15)
	Strongly disagree	0	0
	Total	4	20
Q2. I would find clinical guidelines for assessing and managing hearing/vision impairment during residential aged care useful.	Strongly agree	0	0
	Agree	0	10 (50)
	Neutral	2 (50)	8 (40)
	Disagree	2 (50)	2 (10)
	Strongly disagree	0	0
Total	4	20	
Q3. Most residents with dementia who need a hearing aid (or other assistive hearing device) can use one effectively.	Strongly agree	0	0
	Agree	0	9 (45)
	Neutral	3 (75)	7 (35)
	Disagree	0	4 (20)
	Strongly disagree	0	0
	No response	1 (25)	-
Total	4	20	
Q3-1. If most residents with dementia who need a hearing aid do not use one effectively, what are the reasons for that ineffective use?	Does not fit properly	0	2 (10)
	Hard to use	0	0
	Not tolerated	1 (25)	3 (15)
	Too expensive	0	1 (5)
	Lost or broken	0	4 (20)
	Not effective	0	0
	Other	0	0
	No response	3 (75)	10 (50)
	Total	4	20

Values are presented as n (%).

Thus, the practice, e.g., test and interpretation of those results and checking an assistive device, was not possible in the current situation. However, our respondents did some positive attitudes toward screen for hearing loss and helping elderly with dementia wear their hearing aids if specific clinical guidelines were provided.

Although we consider that direct support of hearing and vision impairments, by fitting hearing aids and eye glasses, is unlikely to succeed in the context of more serious cognitive deficits, such as dementia, and many do think about the complexity of concurrent deficits as well as the low rate of access to vision and hearing services in many elderly people, the related studies have proven that untreated hearing loss negatively affects dementia. Although the current data was only a small sample and limited to a specific regional area, there is a lack of systematic care for dementia patients with hearing loss in Korea, which warrants a follow-up study having a large size of samples collected from equally regional distributions. In

conclusion, a more comprehensive approach for improving outcomes in people with both dementia and sensory impairments is needed in the future and further study for developing needed clinical guidelines for all levels of the health care professionals would be a good option and a positive change for better care for the elderly, especially those with dementia.

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Conflicts of interest

The authors have no financial conflicts of interest.

Author Contributions

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Table 5. Sample results for practice section from nurse and allied health care professionals (n=4) and caregivers (n=20)

Item number	Response	Nurse and allied health care professional	Caregiver
Q1. Do you carry out the testing or checking of hearing aids?	Yes	0	4 (20)
	No	4 (100)	16 (80)
	Total	4	20
Q1-1. If Yes	Patient report	0	1 (5)
	Caregiver report	0	1 (5)
	Checking whether device working	0	6 (30)
	No response	4 (100)	12 (60)
	Total	4	20
Q2. Do you carry out testing or checking of spectacles?	Yes	0	4 (20)
	No	4 (100)	16 (80)
	Total	4	20
Q2-1. If Yes	Patient report	0	2 (10)
	Caregiver report	0	0
	Check whether glass is clean	0	2 (10)
	Check whether the glasses are suitable	0	2 (10)
	No response	4 (100)	14 (70)
	Total	4	20
Q3. Do you have specifically designated staff held responsible for care of hearing (e.g., putting a hearing aid on, changing batteries)?	Yes	2 (50)	6 (30)
	No	2 (50)	14 (70)
	Total	4	20
Q5. I have adequate training and support to use sensory support equipment (hearing aids, amplifiers, lighting).	Yes	1 (25)	7 (35)
	No	3 (75)	13 (65)
	Total	4	20

Values are presented as n (%).

Illustration: Woojae Han. Visualization: Sunghwa You. Writing—original draft: Sunghwa You. Writing—review & editing: Woojae Han.

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