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Author

Ludlow, K, Mumford, V, Makeham, M, Braithwaite, J, Greenfield, D

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Feature Article

The effects of hearing loss on person-centred care in residential aged care: a narrative review



Kristiana Ludlow, BPsych (Hons), MRes ^{a,*}, Virginia Mumford, PhD ^a, Meredith Makeham, PhD ^{a,b}, Jeffrey Braithwaite, PhD ^a, David Greenfield, PhD ^c

^a Australian Institute of Health Innovation, Macquarie University, Level 6, 75 Talavera Road, Sydney, NSW 2109, Australia

^b Australian Digital Health Agency, Level 25, 56 Pitt Street, Sydney, NSW 2000, Australia

^c Australian Institute of Health Service Management, University of Tasmania, Rozelle Campus, Locked Bag 5052, Alexandria, NSW 2015, Australia

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ABSTRACT

Person-centred care is achieved through strategies such as effective communication and shared decision-making. Hearing loss can lead to communication breakdown and social isolation in residential aged care. The review aimed to address how hearing loss affects person-centred care in residential aged care settings. Empirical literature was identified through a systematic search of academic databases. Articles were reviewed against an inclusion criteria and general inductive analysis was employed to identify recurring factors across included studies. Six common factors emerged from the data: communication breakdown, the overlap between hearing loss and cognitive impairment, social isolation and reduced social participation, limited access to hearing services, inadequate training provided to care staff, and strategies to improve communication. Recommended strategies to facilitate person-centred care for residents with hearing loss are presented. Further investigation is needed to understand the effects of hearing loss on residents' autonomy and shared decision-making.

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Introduction

The importance of person-centred care has been recognised internationally by government bodies, policymakers, health professionals, and researchers.¹ Person-centred care encourages mutual collaboration between health care professionals, consumers, and third parties such as family members or carers. This collaboration empowers consumers to be active participants in their care, and supports their autonomy.^{2,3} A principal component of person-centred care is *shared decision-making*, which refers to a consultation process aimed at supporting informed decision-making, while taking into consideration consumers' preferences and values.^{4–6} Shared decision-making is facilitated through proactive initiatives such as exchange of information, and supported decision-making.^{4–6}

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* Corresponding author. Australian Institute of Health Innovation, Macquarie University, Level 6, 75 Talavera Road, Sydney, NSW 2109, Australia. Tel.: +612 9850 2463; fax: +612 8088 6234.

E-mail address: kristiana.ludlow@mq.edu.au (K. Ludlow).

Person-centred care is relevant to the residential aged care sector for two key reasons. First, ageing populations place demands on aged care services such as residential facilities.⁷ In order to meet the needs of older consumers and improve the quality of their care, a consumer-centred approach is necessary.⁸ Second, residents' autonomy and participation in their care is limited by mobility,⁹ cognitive,¹⁰ and sensory,¹¹ impairments.

Person-centred care and shared decision-making require effective communication, where consumers are encouraged to express their opinions and be active participants in their care.^{5,12} One of the major barriers to communication in residential care is age-related hearing loss, or presbycusis.^{13,14} Presbycusis is characterised by a progressive degeneration of auditory functioning resulting in difficulties understanding speech, especially in the presence of background noise, reduced hearing sensitivity, and impaired localisation of sound.¹⁵ In the majority of cases presbycusis initially affects high-frequency hearing, which is associated with consonant sounds.^{15,16} This means that in the early stages of presbycusis, individuals often experience miscommunication and complain of not being able to understand information, as opposed to not being able to hear it.^{15,16} As presbycusis progresses, mid and lower frequencies become harder to hear, exacerbating communication difficulties.^{15,16}

The prevalence of hearing loss increases with age, with age-related hearing loss being the most prevalent form of sensory decline

in older adults.¹⁷ The global rate of age-related hearing loss is high, with 33% of the world population over 65 years experiencing debilitating hearing loss.¹⁸ The social and physical environments of residential aged care facilities further reduce the quality of communication as competing background noise from televisions, radios, announcement systems, and surrounding conversations lead to communication breakdown and social withdrawal in residents with hearing loss.^{14,19}

In order to improve the quality of care provided to residents of aged care facilities, we need to understand how hearing loss affects person-centred care. Existing reviews have either focused on person-centred care in residential aged settings,^{20,21} or have addressed the issue of hearing loss in older individuals.^{22,23} This is, to the best of our knowledge, the first review linking the two concepts together. The study aim is to review and synthesise empirical literature, in order to address the research question: how does hearing loss affect person-centred care in residential aged care?

Methods and materials

Search strategy and criteria

A two-stage narrative review was conducted between March–May 2016, using a systematic approach. KL carried out Stage 1 which involved a review of article abstracts identified through a systematic search of bibliographic databases (Scopus, Web of Science, PubMed and Embase). Any uncertainty regarding the inclusion or exclusion of abstracts was discussed with VM in light of the research question and inclusion criteria until a consensus was reached. The following search terms were entered into each database: “hearing loss” OR “hearing impaired” OR “hearing impairment” OR “presbycusis” AND “aged care” OR “residential aged care” OR “nursing home” OR “long term care” AND “shared decision making” OR “decision making” OR “decisions” OR “communication” OR “autonomy” OR “person centred care” OR “patient centred care.” The search was limited by language, date and publication type in line with the inclusion criteria. Terms were identified through an informal review of the literature and discussions with health care academics and aged care experts. The terms were selected to reflect the use of terminology across countries and care domains (for example, person centred versus patient centred, and residential aged care versus nursing home versus long term care). The term “deaf” was not included in the search strategy as it primarily refers to members of the Deaf community.²⁴ Individuals who have age-related hearing loss experience restricted hearing ability different to Deaf individuals (uppercase ‘D’) in terms of both identify and communication strategies.^{24,25}

The abstracts of articles identified through the search strategy were assessed against the following inclusion criteria: peer-reviewed, English-language journal articles published between 2000–May 2016; empirical research; residential aged care setting; involved health consumers who acquired hearing loss in adult life; referenced person-centred care or associated constructs (shared decision-making, consumer-health professional interactions, communication, and autonomy); and, addressed the associated between hearing loss and person-centred care. Two of the authors, KL and VM, independently carried out the Stage 2 review which consisted of a full text review of selected publications.

Quality assessment

The quality of publications was assessed using the *Mixed Methods Appraisal Tool* as it allowed for the evaluation of qualitative, quantitative, and mixed methods study designs.^{26,27} This tool enabled the evaluation of factors such as risk of bias, appropriateness of tools

and measures, the integration of qualitative and quantitative data, and sampling strategy.

Qualitative synthesis

A statistical analysis was not appropriate for this review due to the heterogeneity of included publications. A narrative approach was therefore taken to allow for descriptive presentation of data.²⁸ Data analysis was carried out by KL using general inductive analysis.²⁹ Each publication was read until a general understanding of the context and patterns within and across the studies was gained. An open coding process consisted of applying descriptive labels to text in order to extract meaning.³⁰ Similar codes were grouped together to form categories, which represented recurring concepts. Categories were revised and refined into broader factors. The remaining authors reviewed and verified the results for accuracy and fidelity.

Results

Study characteristics

The search strategy, outlined in Fig. 1, resulted in the identification of 718 items, which after removal of duplicates resulted in 635 articles. Screening of abstracts reduced the selection to 12 articles that met the study inclusion criteria. KL and VM rated five and nine of the 12 articles as meeting the full text inclusion criteria, respectively. Although not essential due to the low number of included publications, Cohen’s Kappa, a measure of the agreement of raters was calculated for completeness. The agreement rate between reviewers was 66.67%; Cohen’s Kappa = .38, or a fair degree of concordance, in Landis and Koch’s (1977) schema.³² Consensus, via discussion, was reached between the two reviewers which lead to a final inclusion of six publications (Table 1).^{14,33–37}

Two publications employed a qualitative study design^{14,36}; one study used a quantitative design,³⁷ and three studies involved mixed methodology.^{33–35} Only one study recruited both residents and staff members as participants,¹⁴ whereas two studies limited participants to care staff or aides,^{35,36} and the remaining three studies involved only residents as participants.^{33,34,37} The views of relatives were not considered in any of the studies. In Aberdeen and Fereiro’s (2014) study, family members were present during four of the 20 interviews, however their views were not directly assessed.³³ Consumers’ autonomy was not assessed in any of the six studies, and only Looi et al. (2004) made reference to residents’ decision-making.³⁴ In this study, staff members “sometimes” encouraged patients to make decisions, however, the study did not assess the association between hearing loss and decision-making. All six publications evaluated the association between hearing loss and communication, and three of the studies reported on consumer-health professional interactions.^{14,35,36}

Quality assessment

All articles met the *Mixed Methods Appraisal Tool*’s initial screening questions. Four of the six studies received quality scores between 75–100% (see Table 1). Quality scores of 25% were given to Aberdeen and Fereiro (2014)³³ and Looi et al. (2004).³⁴ Both studies scored low on the following criteria: detailed descriptive of qualitative analysis, objective rational for employing mixed methods, objective integration of qualitative and quantitative data, consideration for the limitations associated with integration, and consideration of researchers’ influence on findings.

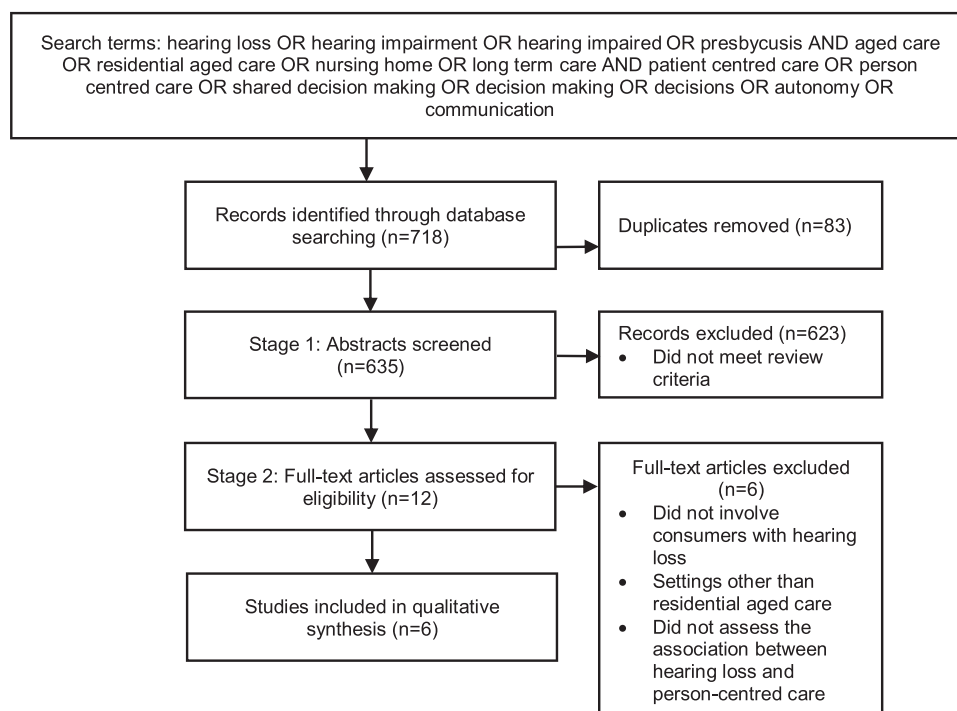


Fig. 1. Search strategy and review process based on PRISMA flow diagram.³¹

Data synthesis

General inductive analysis²⁹ revealed five factors informing the impact of hearing loss on person-centred care in residential aged care, initially, with a sixth factor added after further consideration (Table 2). These were: communication breakdown, the overlap between hearing loss and cognitive impairment, social isolation and reduced social participation, limited access to hearing services, inadequate training provided to care staff, and strategies to improve communication.

Communication breakdown

Communication breakdown as a result of hearing loss was reported in all six studies,^{14,33–37} with environmental factors such as background noise identified as exacerbating communication problems.^{14,33–35,37} For some residents with hearing loss, opportunities for communication were limited by their environment.³⁴ Background noise from music, televisions, radios, announcement systems, and surrounding conversations reduced residents' abilities to hear others and engage in conversations.^{14,33,35,37} Pryce and Goberman-Hill (2011, 2013) highlighted that residents were not provided with choice regarding modifiable background noise from sources such as televisions.^{14,35} Care staff often turned on music or televisions as part of daily routines or to fill in time.³⁵ Not only were residents not asked if they wanted televisions turned on, but they did not notify care staff of their preferences.^{14,35} Some residents found communication with other residents or care staff frustrating, leading them to give up on attempts to compete with environmental noise.¹⁴ Other residents were accepting of the limitations hearing loss placed on them, choosing to engage in more individual activities such as reading.³³

The overlap between hearing loss and cognitive impairment

Cognitive impairment intensified communication difficulties for residents with hearing loss as the effects of mishearing information were coupled with not being able to comprehend what was

being said.^{14,36} The ability of staff members to distinguish between residents' cognitive impairment and hearing loss enabled care staff to employ communication strategies targeted at the source of confusion.³⁶ This proved difficult for care staff who did not know the individual communication needs of residents.³⁶ Tsuruoka et al. (2001) did not establish a relationship between dementia and hearing loss, yet they acknowledged a trend for rates of cognitive deficit to increase with severity of hearing loss.³⁷ Cognitive impairment was also discussed by Looi et al. (2004), as a factor impacting the accuracy of participant responses, thus potentially affecting the internal validity of their study.³⁴

Social isolation and reduced social participation

Hearing loss in residential aged care often resulted in social isolation and placed limits on residents' abilities to participate in social activities such as mealtime conversations or games.^{14,33,34,36} Residents with hearing loss were often left out of conversations and experienced difficulties communicating in group situations.^{14,36,37} As a result, residents experienced social isolation and withdrew to their rooms, or avoided social situations entirely.^{14,33,36} Staff members frequently found themselves responsible for providing social interactions and maintaining conversations with residents.³⁵ This communication was often brief, task-oriented, and based on residents' needs, in contrast with, for example, engagement in in-depth conversations.^{14,34,35}

Limited access to hearing services

Communication between care staff and residents was facilitated by care staff knowledge of audiological services and resources.³⁵ Access to hearing services also required time and effort by care staff to organise appointments and transportation to offsite audiological services.^{14,35} Residential aged care facilitates were reported to lack onsite services and resources, personal amplifiers, volume control telephones, closed captions options on televisions, or assisted listening devices^{14,33,34} which are designed to assist hearing function and communication. For example, Aberdeen and Fereiro

Table 1

Key properties of included publications after full text review.

Study	Country	Study objective(s)	Participants	Methods	Key findings	Mixed Methods Appraisal Tool score (%)
Aberdeen & Fereiro (2014) ³³	Australia	To investigate the facilitation of communication through assistive listening devices.	20 residents	Mixed methods: self-assessed questionnaire and interviews	Participants reported very high levels of satisfaction during tests with assistive listening devices in relation to understanding of speech and sound quality. All participants required assistance to fit and use devices. Ease of use of devices was rated low by participants.	25
Looi et al. (2004) ³⁴	Australia	1) To investigate the prevalence of residents' hearing impairment, activity limitations, and participation restrictions. 2) To assess the communication environment in residential aged care. 3) To describe the implementation and outcomes of audiological rehabilitation interventions.	15 residents	Mixed methods: self-assessed questionnaires and informal conversations	There was a moderate association between hearing impairment and activity limitations/participation restrictions. There were no differences in activity limitations/participation restrictions scores post-intervention, however, qualitative data indicated some benefits of the rehabilitation intervention.	25
Pryce & Gooberman-Hill (2011) ¹⁴	United Kingdom	To explore factors that affect the communication of aged care residents with hearing loss.	18 residents and seven care staff	Qualitative: observations, field notes and interviews	In the study setting, there were no hearing aid maintenance services, additional access to environmental equipment (for example, telephone aids), or staff training specific to hearing services. Environmental noise, for example, during mealtimes and group activities, restricted residents' communication choices. Residents with dementia had a higher risk of communication breakdown; cognitive and language difficulties coupled with hearing loss affected residents' ability to maintain conversation. Hearing loss restricted residents' access to social opportunities.	100
Pryce & Gooberman-Hill (2013) ³⁵	United Kingdom	1) To explore care staff views on hearing loss. 2) To identify the challenges associated with hearing loss in residential aged care. 3) To identify potential elements of interventions.	10 care staff, including managers	Mixed methods: observations, interviews, and surveys	Care staff valued communication with residents and saw it as part of their professional role. Communication between residents and care staff predominantly consisted of checking in with residents rather than engaging in lengthy conversations. Care staff had limited knowledge about, and access to, services regarding residents' hearing loss.	75
Slaughter et al. (2014) ³⁶	Canada	1) To explore health care aides' perception of hearing loss in aged care residents with dementia. 2) To assess how health care aides perceive the impact of residents' hearing loss on daily living and their participation in social activities.	12 health care aides	Qualitative: semi-structured interviews, field notes, and reflective memos	Health care aides reported difficulties distinguishing the relative contributions of hearing loss and dementia to communication breakdowns. Health care aides reported that familiarity with residents helped them differentiate between sensory versus cognitive impairments in conversations with residents. Communication difficulty complicated health care aides' provision of care and support of quality of life.	100
Tsuruoka et al. (2001) ³⁷	Japan	To explore the effects of hearing impairment on quality of life indicators for aged care residents.	60 residents	Quantitative: self-assessed questionnaires	There was a significant negative correlation between communication performance and severity of hearing loss. The most common types of communication problems experienced by residents were understanding conversations in general, and understanding conversations in a group situation.	100

Table 2

Factors informing the impact of hearing loss on person-centred care in residential aged care.

Factor	Description	Example	Publications
Communication breakdown	Difficulties in communication with other residents and care staff. Hearing loss and background noise were contributing factors.	Problems understanding, and engaging in, conversations.	14,33–37
The overlap between hearing loss and cognitive impairment	Cognitive impairment intensified communication difficulties for residents with hearing loss.	Confusion resulting from a combination of mishearing information and cognitive impairment.	14,34,36,37
Social isolation and reduced social participation	Hearing loss meant that residents withdrew from social activities due to problems communicating in group situations.	Withdrawing to private rooms instead of engaging in social activities.	14,33–37
Limited access to hearing services	Residential care facilities lacked access to audiological services and resources.	Unavailability of assisted listening devices, personal amplifiers, volume control telephones, or closed captions options on televisions.	14,33–35
Inadequate training provided to care staff	Formal staff training relating to the communication needs of residents with hearing loss was lacking.	The provision of information on cleaning and maintaining hearing aids.	14,33–35
Strategies to improve communication	Approaches to improve communication were directed at staff behaviours, and environmental modifications.	Clear pronunciation for residents who lip-read.	14,33–36

(2014) assessed residents' evaluation of assisted listening devices as a tool for communication facilitation.³³ The majority (90%, $n = 18$) of participants in this study gave assisted listening devices high ratings in terms of improving their understanding of speech and enhancing the quality of sound.³³ Assisted listening devices were reported to enhance conversation and communication, and provide greater clarity compared to standard hearing aids.³³

Inadequate training provided to care staff

Despite a desire to improve communication with hearing impaired residents,^{34,35} little information or formal training was provided or offered to care staff.^{14,33,35} Pryce & Goberman-Hill (2013) reported that care staff did not know how to address the communication issues of residents, or how to manage hearing aid maintenance, for example, inserting and cleaning devices.³⁵ Although some staff members recognised the limitations of hearing aids, others viewed hearing aids as a simple fix, indicating a need for more education surrounding hearing aids.³⁵ Looi et al. (2004) provided an intervention to care staff in the form of a training program.³⁴ This training led to individualised resident information sheets, informing staff members of hearing aid management, for example, insertion of devices, changing batteries, or turning hearing aids off and on.³⁴

Strategies to improve communication

Strategies to improve communication were directed at staff behaviours, and environmental modifications. At a behavioural level, care staff employed strategies to enhance communication including repetition, slowed speech, face-to-face conversations, clear pronunciation for residents who lip-read, writing information down, and using body language.^{35,36} These strategies were learnt from experience and not through formal training.³⁵ Slaughter et al. (2014) emphasised the need to adapt strategies dependent on the situation, for example, talking in close proximity may assist communication, however, this could also put the safety of care staff at risk when talking to residents, who can sometimes lash out physically.³⁶ Forming close relationships with residents was reported by care staff to assist communication.^{35,36} Familiarity with residents and knowledge of individual's communication needs enabled care staff to distinguish between confusion resulting from hearing loss or cognitive impairment.^{35,36}

The modification of contextual and environmental factors was discussed in the several of the included as a means of improving communication.^{14,34,35} A reduction of background noise could be achieved by eliminating unnecessary noise, for example, turning off televisions or closing kitchen doors.^{14,35} After an environmental

assessment, Looi et al. (2004) suggested that absorbent materials could be better incorporated into residential facilities.³⁴

Discussion

Hearing loss and communication breakdown in residential aged care were found to restrict residents' engagement and participation in the life of the aged care facilities. Five of the six factors identified across studies, with the exception of strategies to improve communication, negatively reinforced each other, compromising the care of residents.

As a result, the achievement of person-centred care was limited. Shared decision-making occurs in some instances and not others, determined by the specific interaction of the resident, care staff, and context at the time. An improved understanding of hearing loss and cognitive impairment, modification of environmental factors such as the reduction of background noise, formal staff training, and improved access to hearing services, could facilitate communication opportunities and thus more person-centred care for aged care residents with hearing loss.

More specifically, this area is a huge challenge: obviously, if residents can't hear, then communication is at risk, and person-centred care is a formidable problem. Nevertheless, a range of strategies to address these barriers, which we have extracted from the studies, are summarised in Table 3.

The empirical research base from which this knowledge has been derived is modest: the insights were derived from six studies. Not one study in this review directly assessed consumers' autonomy or shared decision-making. The review did not identify any studies directing assessing the opinions of family members despite the significant role they play in residents' care and the decision-making process.^{38,39}

Widening the scope of this review to include pre-2000 literature, non-English studies, and descriptive or theoretical publications may have provided additional knowledge; however, the search restrictions were designed in order to identify current evidence-based information. The review focussed on residential aged care settings due to the global issue of ageing populations,⁷ and the limits placed on residents' autonomy by mobility,⁹ cognitive,¹⁰ and sensory¹¹ impairments. Comparisons across different health settings would better inform the care provided to older consumers with hearing loss. Further research is needed to assess the effects of hearing loss across various domains of person-centred care, not just communication or interactions between residents and care staff. Investigating how hearing loss affects person-centred care for older consumers across other settings, for example, hospital

Table 3

Recommended strategies to facilitate person-centred care for residents with hearing loss.

Strategy	Recommendations
Care Staff Interactions with Residents	<ul style="list-style-type: none"> • Ask residents about their satisfaction with background noise. For example, do residents prefer music to be turned on or off in activity rooms? • Move beyond brief task-oriented interactions with residents by engaging them in meaningful conversations. This might require additional effort by care staff to find suitable communication methods tailored to individuals' needs. • Repeat speech if resident does not understand what has been said or if they look confused. • Use clear and slowed speech, but not so slow that speech becomes unnatural. • Make sure to face residents when talking to them, especially for those residents who can lip-read. • Use additional forms of communication to improve the message being conveyed, for example use of body language and facial expressions. • Identify residents' preferred methods of communication. For example, some residents may prefer care staff to write important messages down for them as well as trying to communicate the message verbally.
Training and Education for Care Staff	<ul style="list-style-type: none"> • Provide training for staff to inform them of the differences between hearing loss and dementia. This will enable them to better identify the cause of miscommunication or confusion, and adapt their behaviours accordingly. • Educate care staff about available audiological services and how to access them. • Provide training for care staff regarding hearing aid maintenance, including inserting devices, changing batteries, cleaning devices, adjusting device settings, and turning devices on and off. • Educate care staff regarding the benefits and disadvantages of hearing aids and other devices.
Hearing Services and Resources	<ul style="list-style-type: none"> • Provide assisted listening devices where appropriate. • Identify television channels that offer closed captioning. • Provide access to audiological services such as the regular assessment of residents' hearing.
Environment Modifications	<ul style="list-style-type: none"> • Turn off televisions and radios when not in use. • Close doors where possible to reduce background noise. • Place individualised notice boards or information sheets in residents' rooms to inform care staff of their hearing and communication needs. • Integrate absorbent material in facilities. • Provide quieter activities or activity spaces for residents so that they can still interact with other people without having to compete with background noise.

environments, which are subject to high levels of background noise,⁴⁰ is also necessary.

Conclusions

Person-centred care is the future for aged and health care sectors. However, there is a significant gap between the ideal and the reality, particularly in residential aged care for those with hearing loss. The findings of this review suggest that an understanding of the combined effects of cognitive impairment and hearing loss, modification of environmental factors such as the reduction of background noise, formal staff training, improved access to hearing services, and engagement in communication enhancing strategies, could facilitate communication opportunities and thus person-centred care for aged care residents with hearing loss. Identifying the challenges and barriers to person-centred care provides the groundwork to improve residential aged care services for older consumers with hearing loss in the future.

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References

1. Harter M, van der Weijden T, Elwyn G. Policy and practice developments in the implementation of shared decision making: an international perspective. *Z Evid Fortbild Qual Gesundheitswes.* 2011;105(4):229–233. doi:10.1016/j.zefq.2011.04.018.
2. Australian Commission on Safety and Quality in Health Care. *Patient-Centred Care: Improving Quality and Safety Through Partnerships with Patients and Consumers.* Sydney, Australia: ACSQHC; 2011.
3. Levenstein JH, McCracken EC, McWhinney IR, Stewart MA, Brown JB. The patient-centred clinical method. 1. A model for the doctor-patient interaction in family medicine. *Fam Pract.* 1986;3(1):24–30. doi:10.1093/famp/3.1.24.
4. Charles C, Gafni A, Whelan T. Decision-making in the physician-patient encounter: revisiting the shared treatment decision-making model. *Soc Sci Med.* 1999;49(5):651–661. doi:10.1016/S0277-9536(99)00145-8.
5. Elwyn G, Frosch D, Thomson R, et al. Shared decision making: a model for clinical practice. *J Gen Intern Med.* 2012;27(10):1361–1367. doi:10.1007/s11606-012-2077-6.
6. Hoffmann T, Légaré F, Simmons M, et al. Shared decision making: what do clinicians need to know and why should they bother? *Med J Aust.* 2014;201(1):35–39. doi:10.5694/mja14.00002.
7. National Institute on Aging, World Health Organization. *Global Health and Ageing.* Bethesda, MD: NIA and WHO; 2011.
8. Australian Aged Care Quality Agency. *Let's Talk About Quality – Developing a Shared Understanding of Quality in Aged Care Services.* Sydney, Australia: Australian Aged Care Quality Agency; 2015.
9. Taylor JA, Sims J, Haines TP. Quality improvements in resident mobility care: using person- and relationship-centered frameworks. *Gerontologist.* 2014;54(3):501–513. doi:10.1093/geront/gnt082.
10. Edvardsson D, Fetherstonhaugh D, Nay R. Promoting a continuation of self and normality: person-centred care as described by people with dementia, their family members and aged care staff. *J Clin Nurs.* 2010;19(17–18):2611–2618. doi:10.1111/j.1365-2702.2009.03143.x.
11. Schneider JM, Gopinath B, McMahon CM, Leeder SR, Mitchell P, Wang JJ. Dual sensory impairment in older age. *J Aging Health.* 2011;23(8):1309–1324. doi:10.1177/0898264311408418.
12. Australian Commission on Safety and Quality in Health Care. *Improving Quality and Safety by Focusing Care on Patients and Consumers.* Canberra, Australia: ACSQHC; 2010.
13. Huang Q, Tang J. Age-related hearing loss or presbycusis. *Eur Arch Otorhinolaryngol.* 2010;267(8):1179–1191. doi:10.1007/s00405-010-1270-7.
14. Pryce H, Gooberman-Hill R. 'There's a hell of a noise': living with a hearing loss in residential care. *Age Ageing.* 2011;41:40–46. doi:10.1093/ageing/afr112.
15. Gates G, Mills J. Presbycusis. *Lancet.* 2005;366(9491):1111–1120. doi:10.1016/S0140-6736(05)67423-5.
16. Blevins N. Presbycusis. In: Deschler D, Sokol N, eds. *UpToDate.* Waltham, MA: UpToDate; 2015.
17. Ciorba A, Bianchini C, Pelucchi S, Pastore A. The impact of hearing loss on the quality of life of elderly adults. *Clin Interv Aging.* 2012;7:159–163. doi:10.2147/CIA.S26059.

18. World Health Organization. Hearing Loss in Persons 65 Years and Older Based on WHO Global Estimates on Prevalence of Hearing Loss. 2012. http://www.who.int/pbd/deafness/news/GE_65years.pdf?ua=1.
19. Hickson L, Worrall L, Wilson J, Tilse C, Setterlund D. Evaluating communication for resident participation in an aged care facility. *Int J Speech Lang Pathol*. 2005;7(4):245–257. doi:10.1080/14417040500337047.
20. Li J, Porock D. Resident outcomes of person-centered care in long-term care: a narrative review of interventional research. *Int J Nurs Stud*. 2014;51(10):1395–1415. doi:10.1016/j.ijnurstu.2014.04.003.
21. Brownie S, Nancarrow S. Effects of person-centred care on residents and staff in aged-care facilities: a systematic review. *Clin Interv Aging*. 2013;8:1–10. doi:10.2147/CIA.S38589.
22. Laplante-Lévesque A, Hickson L, Worrall L. Rehabilitation of older adults with hearing impairment: a critical review. *J Aging Health*. 2010;22(2):143–153. doi:10.1177/0898264309352731.
23. McCormack A, Fortnum H. Why do people fitted with hearing aids not wear them? *Int J Audiol*. 2013;52(5):360–368. doi:10.3109/14992027.2013.769066.
24. World Federation of the Deaf. Deaf Culture. n.d. <https://wfdeaf.org/our-work-2/focus-areas/deaf-culture/>.
25. Padden C, Humphries T. Introduction. The lens of culture. In: Padden C, Humphries T, eds. *Inside Deaf Culture*. London, UK: Harvard University Press; 2005:1–10.
26. Souto R, Khanassov V, Hong Q, Nush P, Pluye P. Systematic mixed studies reviews: updating results on the reliability and efficiency of the Mixed Methods Appraisal Tool. *Int J Nurs Stud*. 2015;52(1):500–501. doi:10.1016/j.ijnurstu.2014.08.010.
27. Pace R, Pluye P, Bartlett G, et al. Testing the reliability and efficiency of the pilot Mixed Methods Appraisal Tool (MMAT) for systematic mixed studies review. *Int J Nurs Stud*. 2012;49(1):47–53. doi:10.1016/j.ijnurstu.2011.07.002.
28. Coughlan M, Cronin P, Ryan F. Synthesising the literature. In: Coughlan M, Cronin P, Ryan F, eds. *Doing a Literature Review in Nursing, Health and Social Care*. Thousand Oaks, CA: Sage Publications; 2013:98–99.
29. Thomas DR. A general inductive approach for analyzing qualitative evaluation data. *Am J Eval*. 2006;27(2):237–246. doi:10.1177/1098214005283748.
30. Newell R, Burnard P. A pragmatic approach to qualitative data analysis. In: Newell R, Burnard P, eds. *Research for Evidence-Based Practice in Healthcare*. 2nd ed. Hoboken, NJ: Wiley-Blackwell; 2010:97–107.
31. Moher D, Liberati A, Tetzlaff J, Altman D, The PRISMA Group. Preferred reporting items for systematic reviews and meta-analyses: the PRISMA Statement. *PLoS Med*. 2009;6(7):e1000097. doi:10.1371/journal.pmed.1000097.
32. Landis JR, Koch GG. The measurement of observer agreement for categorical data. *Biometrics*. 1977;33(1):159–174. doi:10.2307/2529310.
33. Aberdeen L, Fereiro D. Communicating with assistive listening devices and age-related hearing loss: perceptions of older Australians. *Contemp Nurse*. 2014;47(1–2):119–131. doi:10.5172/conu.2013.4273.
34. Looi V, Hickson L, Price A, et al. Audiological rehabilitation in a residential aged care facility. *Aust N Z J Audiol*. 2004;26(1):12–29. doi:10.1375/audi.26.1.12.55989.
35. Pryce H, Goberman-Hill R. Foundations of an intervention package to improve communication in residential care settings: a mixed methods study. *Hearing Balance Commun*. 2013;11(1):30–38. doi:10.3109/21695717.2012.756224.
36. Slaughter S, Hopper T, Ickert C, Erin D. Identification of hearing loss among residents with dementia: perceptions of health care aides. *Geriatr Nurs*. 2014;35(6):434–440. doi:10.1016/j.gerinurse.2014.07.001.
37. Tsuruoka H, Masuda S, Ukai K, Sakakura Y, Harada T, Majima Y. Hearing impairment and quality of life for the elderly in nursing homes. *Auris Nasus Larynx*. 2001;28(1):45–54. doi:10.1016/S0385-8146(00)00074-2.
38. Davies S, Nolan M. 'Making it better': self-perceived roles of family caregivers of older people living in care homes: a qualitative study. *Int J Nurs Stud*. 2006;43(3):281–291. doi:10.1016/j.ijnurstu.2005.04.009.
39. O'Shea F, Weathers E, McCarthy G. Family care experiences in nursing home facilities. *Nurs Older People*. 2014;26(2):26–31. doi:10.7748/nop2014.02.26.2.26.e543.
40. Juang D, Lee C, Yang T, Chang M. Noise pollution and its effects on medical care workers and patients in hospital. *Int J Environ Sci Technol (Tehran)*. 2010;7(4):705–716. doi:10.1007/BF03326180.