

Evidence-to-recommendation table

Problem Is the problem a priority?		
JUDGEMENT	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS
<input type="radio"/> No <input type="radio"/> Probably no <input type="radio"/> Probably yes <input checked="" type="radio"/> Yes <input type="radio"/> Varies <input type="radio"/> Don't know	<p>The ageing population means that the absolute numbers of those living with cognitive decline or dementia continue to rise, with an estimated prevalence of 75 million by 2030 and a new case of dementia diagnosed every three seconds⁽¹⁾ Anything that could reduce the incidence of cognitive decline or dementia would have huge importance for individual health, society and health care providers. Hearing loss is a prevalent age-related disorder. It is the fourth leading cause of years lived with disability in the global population⁽²⁾ It also increases the risk of cognitive decline/dementia⁽³⁾. Hearing loss and cognitive impairment or dementia, individually, and in combination, predict functional ability and burden of care. Correcting hearing loss may reduce risk of cognitive decline and dementia in later life and also improve outcomes for the elderly on multiple domains.</p>	<p>A recent meta-analysis of prospective cohort studies showed that the relative risk of hearing impairment on incident Alzheimer's and MCI was 2.82 (95% CI 1.47 to 5.42) ⁽⁴⁾</p>
Desirable Effects How substantial are the desirable anticipated effects?		
JUDGEMENT	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS
<input type="radio"/> Trivial <input type="radio"/> Small <input type="radio"/> Moderate <input type="radio"/> Large <input type="radio"/> Varies <input checked="" type="radio"/> Don't know	<p><i>Desirable effects:</i></p> <p>For cognitive function and quality of life outcomes the volume and quality of evidence was very low. No data on MCI or incident dementia. No meta-analyses were conducted, and there was not robust information on clinical significance of results.</p>	<p>Primary review ⁽⁵⁾ reported that hearing aids use was found to be associated with improvements in cognitive function, however these benefits were limited. Cognitive improvements were shown to revert to baseline at one year follow up. The review also reported that the use of hearing aids in the elderly may be associated with improvements in quality of life, however there is no conclusive evidence.</p> <p>One review ⁽⁶⁾ reported that the use of cochlear implantation improved quality of life but the cognitive benefits were inconclusive. One review (Henshaw et al.) examined computer-</p>

		based auditory based training and found poor quality evidence which was not possible to draw conclusions from.
<h3>Undesirable Effects</h3> <p>How substantial are the undesirable anticipated effects?</p>		
JUDGEMENT	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS
<input type="radio"/> Large <input type="radio"/> Moderate <input checked="" type="radio"/> Small <input type="radio"/> Trivial <input type="radio"/> Varies <input type="radio"/> Don't know	<p><i>Undesirable effects:</i></p> <p>No evidence on functional level, dropout rates or adverse events.</p>	<p>Possible problems associated with of hearing aid may include background interference, or other issues with sound, volume and comfort.</p>
<h3>Certainty of evidence</h3> <p>What is the overall certainty of the evidence of effects?</p>		
JUDGEMENT	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS
<input checked="" type="radio"/> Very low <input type="radio"/> Low <input type="radio"/> Moderate <input type="radio"/> High <input type="radio"/> No included studies	<p>For cognitive function and quality of life, the certainty of evidence is very low. No evidence for MCI, dementia, functional level (ADL, IADL), adverse events, drop outs.</p>	
<h3>Values</h3> <p>Is there important uncertainty about or variability in how much people value the main outcomes?</p>		
JUDGEMENT	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS
<input type="radio"/> Important uncertainty or variability <input type="radio"/> Possibly important uncertainty or variability <input type="radio"/> Probably no important uncertainty or variability <input checked="" type="radio"/> No important uncertainty or variability	<p>A review conducted by Anderson et al 2009(7) on public perceptions about cognitive health in the United States revealed that a large proportion of the population were concerned about declines in cognition or memory. Further studies in Australia(8)and the United Kingdom(9)(UK) and have shown a general trend of individuals being fearful of developing dementia. Data from low and middle income countries is unavailable.</p> <p>There is no evidence showing that individuals would oppose dementia risk reduction, or view cognitive decline favourably. Hence, there is no reason to believe there is important</p>	<p>Additional sources like the Saga Survey(10) and Alzheimer's Research UK(11) have reported high percentage of people in the UK fear dementia, even more so than cancer, and feel a prognosis would mean their life is over (62%).</p>

	uncertainty about or variability in how much people value reducing the risk of cognitive decline and/or dementia.	
Balance of effects Does the balance between desirable and undesirable effects favor the intervention or the comparison?		
JUDGEMENT	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS
<ul style="list-style-type: none"> <input type="radio"/> Favors the comparison <input type="radio"/> Probably favors the comparison <input type="radio"/> Does not favor either the intervention or the comparison <input type="radio"/> Probably favors the intervention <input type="radio"/> Favors the intervention <input type="radio"/> Varies <input checked="" type="radio"/> Don't know 	<p>Does not favour either the intervention or the comparison (hearing aids may improve quality of life but the amount of evidence available is limited). No data on adverse effects was available.</p>	
Resources required How large are the resource requirements (costs)?		
JUDGEMENT	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS
<ul style="list-style-type: none"> <input type="radio"/> Large costs <input checked="" type="radio"/> Moderate costs <input type="radio"/> Negligible costs and savings <input type="radio"/> Moderate savings <input type="radio"/> Large savings <input type="radio"/> Varies <input type="radio"/> Don't know 	<p>N/A (no conclusive evidence favouring the hearing aids as an intervention for reducing the risk of cognitive decline or dementia).</p> <p>For hearing aid interventions, there no data with respect to cost in the included studies. The resource requirements of hearing aid interventions are likely to involve associated costs for hearing assessments, audiology appointments and hearing aid devices; this will vary between healthcare policies and between different countries.</p>	<p>The NICE guidelines⁽¹²⁾ state that adults with suspected or diagnosed dementia or cognitive impairment should be referred for a hearing assessment, and list hearing aids as one of the treatment pathways for adults with hearing loss that affects their ability to communicate or hear, followed by audiology follow up appointments six to twelve week following fitting.</p>

Certainty of evidence of required resources What is the certainty of the evidence of resource requirements (costs)?		
JUDGEMENT	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS
<input type="radio"/> Very low <input checked="" type="radio"/> Low <input type="radio"/> Moderate <input type="radio"/> High <input type="radio"/> No included studies	<p>N/A (No conclusive evidence favouring the hearing aids as an intervention for reducing the risk of cognitive decline or dementia).</p> <p>For hearing aid interventions, there is great uncertainty due to lack of data in the included studies. No formal evidence reporting on mean cost of hearing aid interventions to the individual or to government; this would depend on individual countries welfare rebates and policies. Also the resource costs are variable depending upon type of intervention.</p>	
Cost effectiveness Does the cost-effectiveness of the intervention favor the intervention or the comparison?		
JUDGEMENT	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS
<input type="radio"/> Favors the comparison <input type="radio"/> Probably favors the comparison <input type="radio"/> Does not favor either the intervention or the comparison <input type="radio"/> Probably favors the intervention <input type="radio"/> Favors the intervention <input type="radio"/> Varies <input checked="" type="radio"/> No included studies	<p>Inconclusive, no high quality review evidence available on cost effectiveness of hearing aids.</p> <p>A cost effectiveness analysis conducted in 2008 (13) reported hearing aids in elderly populations was a cost effective strategy. It reported “incremental cost for gaining an additional hearing-related quality-adjusted life-years in women and men were US \$13615 and 9702 respectively”. However, the model was based on a small number of primary studies with data from higher income countries and modelled solely on hearing improvement. Another important cost-effectiveness factor which was not consider in this analysis is that many fitted with hearing aids do not wear them.(14)</p> <p>Data from low and middle income countries is unavailable.</p>	<p>The only review(15) was conducted on the cost-effectiveness compared digital hearing aids to analogue hearing aids. It showed no additional benefit of digital over analogue hearing aids.</p>
Equity What would be the impact on health equity?		
JUDGEMENT	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS
<input type="radio"/> Reduced <input type="radio"/> Probably reduced <input type="radio"/> Probably no impact <input checked="" type="radio"/> Probably increased <input type="radio"/> Increased	<p>A report from the Institute of Health on inequalities in cognitive impairment and dementia among older persons(16)studies health equities in England, They found that individuals with lower socioeconomic status (SES) were at increased risk of earlier onset of dementia, cognitive dysfunction at earlier stages of cognitive decline and impairment, and tend to have fewer resources to cope with symptoms, as compared to higher SES groups. Further, lower SES</p>	

<ul style="list-style-type: none"> <input type="radio"/> Varies <input type="radio"/> Don't know 	<p>groups are likely to live and age in environments that are physically and economically less supportive of social connection physical activity or mental stimulation, which can increase the risk of cognitive impairment and dementia in later life.</p> <p>Based on this it is likely that interventions to reduce risk of cognitive decline and dementia will increase equity in health.</p>	
<h3>Acceptability</h3> <p>Is the intervention acceptable to key stakeholders?</p>		
JUDGEMENT	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS
<ul style="list-style-type: none"> <input type="radio"/> No <input type="radio"/> Probably no <input type="radio"/> Probably yes <input type="radio"/> Yes <input checked="" type="radio"/> Varies <input type="radio"/> Don't know 	<p>A scoping review(14) and the Epidemiology of Hearing Loss Study has been shown that a large proportion hearing impaired elderly adults do not utilise their hearing aids.(17) The scoping review by McCormack et al 2013 suggested hearing aid value, fit and comfort and maintenance of the hearing aid, attitude, device factors, financial reasons, psycho-social/situational factors, healthcare professionals attitudes, ear problems, and appearance were some of the nominated reasons for this.</p> <p>Data from low and middle income countries is unavailable.</p> <p>Lack of public awareness about modifiable dementia risk factors can interfere with help seeking and public acceptability of these interventions.</p>	<p>A recent review by Cations et al, 2018(18) on the general public's perception and prevention of dementia suggests that knowledge about the potential for dementia risk reduction remains poor but may be improving over time. However, hearing correction was not a dementia prevention strategy covered by primary studies and individuals may lack awareness of the link between dementia and hearing impairment.</p>
<h3>Feasibility</h3> <p>Is the intervention feasible to implement?</p>		
JUDGEMENT	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS
<ul style="list-style-type: none"> <input type="radio"/> No <input type="radio"/> Probably no <input type="radio"/> Probably yes <input type="radio"/> Yes <input checked="" type="radio"/> Varies <input type="radio"/> Don't know 	<p>Both hearing aids and usual care/no intervention are already being used in hearing impaired populations currently. However, issues with compliance may cause barriers to proper implementation. A scoping review(14) and the Epidemiology of Hearing Loss Study has been shown that a large proportion hearing impaired elderly adults do not utilise their hearing aids(17) The scoping review by McCormack et al 2013 suggested hearing aid value, fit and comfort and maintenance of the hearing aid, attitude, device factors, financial reasons, psycho-social/situational factors, healthcare professionals attitudes, ear problems, and appearance were some of the nominated reasons for this.</p> <p>Based on the limited high quality evidence available on feasibility, it is not possible to make conclusions.</p>	

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