Integrated care for older people (ICOPE)
Guidelines on community-level interventions to manage declines in intrinsic capacity

Evidence profile: hearing loss

Scoping question:
Does case finding and provision of hearing aids or assistive listening devices produce any benefit or harm for older people 60 years of age and over with hearing loss?

The full ICOPE guidelines and complete set of evidence profiles are available at who.int/ageing/publications/guidelines-icope

Painting: “Wet in Wet” by Gusta van der Meer. At 75 years of age, Gusta has an artistic style that is fresh, distinctive and vibrant. A long-time lover of art, she finds that dementia is no barrier to her artistic expression. Appreciated not just for her art but also for the support and encouragement she gives to other artists with dementia, Gusta participates in a weekly art class. Copyright by Gusta van der Meer. All rights reserved
Evidence profile: hearing loss

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**Background**

With increasing age, deterioration in hearing sensitivity rises sharply. About one third of people 65 years of age and over live with some degree of hearing loss (1) and between 50% and 80% of older people over 80 years of age experience significant hearing loss. Hearing loss in older people is strongly associated with reduced functional ability, social isolation, depression, cognitive decline, poor quality of life, and need for care (2-5). In most countries, particularly in low- and middle-income countries, hearing loss in older people is largely undetected and undertreated. This is mainly due to the lack of community outreach and lack of systematic screening for hearing loss in older people.

The most common form of treatment for hearing loss in older people is the provision of a hearing aid. Effective management strategies for hearing loss includes use of technologies such as hearing aids, assistive listening devices or cochlear implants, health education, environmental modifications (reducing interfering background noise, for example) and behavioural adaptations for the person and for their communication partners (simple communication techniques such as speaking clearly, for example) (6). Research evidence suggests that hearing aid use is strongly associated with improved communication in relationships, emotional stability, perception of mental functioning and physical health, and improved quality of life (8). Despite the increased availability of technology, however, the proportion of older people with hearing loss who use hearing aids is low (9). Moreover, evidence on effective case-finding and provision of care is mostly from high-income countries. The extent to which this evidence is generalizable to poorly resourced settings is unclear. This review has thus set out to answer two key questions: first, whether screening and provision of hearing aids are effective in improving hearing-related outcomes; and, second, whether education and educational interventions improve the uptake or adherence of hearing aid use among older people.
Part 1: Evidence review

Scoping question in PICO format (population, intervention, comparison, outcome)

Population
• Older people 60 years of age and over (both male and female) with hearing loss

Intervention
• Screening and provision of a hearing aid or assistive listening device
• Educational intervention to improve uptake or use of hearing aid

Comparison
• Referral, no service or delayed treatment

Outcome
• Critical: Improvement in communication, social function, hearing use
• Important: Depression, quality of life, use of verbal communication strategy, self-reported hearing handicap scale
Search strategy

Details of the search strategy are given in Annex 1.

List of systematic reviews and individual studies identified by the search process

Included in GRADE tables (10–13)


## PICO Table

<table>
<thead>
<tr>
<th>Intervention/comparison</th>
<th>Outcomes</th>
<th>Systematic reviews and individual studies used for GRADE tables</th>
<th>Explanation</th>
</tr>
</thead>
</table>
| 1 Screening for hearing loss compared with no screening | • Use of hearing aid  
| 2 Screening and provision of hearing aid or assistive listening device compared with no hearing aid or assistive listening device | • Social function  
• Communication  
Individual study relevant to the area |
| 3 Self-management support compared with control (alternative intervention) | • Quality of life  
• Self-reported hearing handicap  
Narrative description of the studies that went were included into in the analysis

Screening for hearing loss versus no screening (GRADE table 1)

The larger of the two studies by Yueh et al. (10) was a randomized controlled trial on screening for hearing loss. It compared three different screening strategies (the AudioScope, based on inability to hear a 40dB tone at 2000 Hz in either ear; the Hearing Handicap Inventory for Elderly-Screening (HHIE-S), based on a score >10; or the AudioScope plus the HHIE-S versus usual care (no screening) in 2305 older veterans (94% males). The primary outcome of the study was hearing aid use at one year.

Screening and provision of hearing aids (GRADE table 2)

Two trials evaluated the benefits of amplification compared with no amplification for the treatment of screening-detected hearing loss. The study by Mulrow et al. (12) was a randomized controlled trial on treatment for hearing loss in older adults. It assessed whether hearing aids improved the quality of life of elderly people with hearing loss. The authors evaluated 194 older male veterans (mean age: 72 years) who were randomly assigned to immediate hearing aids or to a waiting list control for four months. Hearing-related quality of life outcomes were measured using the Hearing Handicap Inventory for the Elderly (HHIE) and the Quantified Denver Scale of Communication Function (QDS) at baseline, six weeks, and four months.

The randomized controlled trial by Yueh et al. (11) enrolled 64 veterans (mean age, 68 years). Those eligible in the United States of America for free Veterans Health Administration-issued hearing aids were randomly assigned to a standard non-directional or a programmable-directional digital hearing aid (intervention group), while ineligible veterans were randomly assigned to an assistive listening device or no treatment. The main outcome measures were hearing-related quality of life, self-rated communication ability, adherence to use, and willingness to pay for the amplification devices (measured three months after fitting).

Self-management support interventions compared with controls (GRADE table 3)

The Cochrane systematic review by Barker et al. (13) assessed the effectiveness of interventions to promote the use of hearing aids in adults with acquired hearing loss fitted with at least one hearing aid. The search for trials was conducted using the Cochrane Ear, Nose and Throat Disorders Group trial register and additional sources for both published and unpublished data. There were no language or date restrictions on the search. Experts in the field were contacted for additional information behind that included in the published report of the trials. Two review authors worked independently to extract data and assess the methodological quality of the trials. They included in their review randomized controlled trials of interventions to improve or promote hearing aid use in adults with acquired hearing loss, compared with usual care or another intervention. The authors classified these interventions according to Wagner’s ‘chronic care model’ (14). Two studies addressed the effects of self-management support interventions on short- to medium-term daily hours of hearing aid use but they could not be combined in a meta-analysis and were not included in the GRADE tables of this review by WHO. Fitzpatrick (15) enrolled 24 participants ranging in age from 45 to 88 years (14 into the intervention group, and 10, the control group). She reported that

(continued next page)
eight participants (57%) in the auditory training intervention group wore their hearing aids all of the time before, after and during therapy, and six participants (43%) wore hearing aids in a larger number of listening situations after therapy. In the control group who received lectures on hearing loss, hearing aids and communication over the same time period, seven participants (70%) wore their hearing aids all of the time, and three (30%) wore their aids in limited situations before and after the lectures. Saunders et al. (16) recruited 60 participants (age range: 55 to 81 years; no control group) among first-time hearing aid users. They compared a pre-fitting demonstration of listening situations against a fitting without this demonstration and reported that four out of 20 participants in the intervention group, and one out of 20 in the control group wore their hearing aids for more than eight hours per day. The clinical significance of this result is unclear.
**GRADE table 1: Screening for hearing loss versus no screening**

**Author:** WHO systematic review team  
**Date:** Between 1st October and 15th November 2015  
**Question:** Screening for hearing loss compared with no screening for older people with hearing loss  
**Setting:** Primary care or community  

<table>
<thead>
<tr>
<th>Quality assessment</th>
<th>Number of patients</th>
<th>Effect</th>
<th>Quality</th>
<th>Importance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Study design</td>
<td>Risk of bias</td>
<td>Indirectness</td>
<td>Imprecision</td>
<td>Other considerations</td>
</tr>
<tr>
<td>Number of studies</td>
<td>of trials</td>
<td>not serious</td>
<td>serious a</td>
<td>not serious</td>
</tr>
<tr>
<td>Hearing aid use (follow up 1 year; assessed with self-report and direct observation)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a Indirectness: Downgraded once as all participants in the trial were eligible to receive free VA-issued hearing aids and trial was carried out in a high-income country. Therefore, generalizing evidence to other settings is questionable.

b Other consideration: Downgraded once as evidence is from one trial.
### GRADE table 2: Screening and provision of hearing aids

**Author:** WHO systematic review team  
**Date:** Between 1 October and 15 November 2015  
**Question:** Provision of hearing aid or assistive listening device compared with no hearing aid or assistive listening device for older people with hearing loss  
**Setting:** Primary care or community  

<table>
<thead>
<tr>
<th>Quality assessment</th>
<th>Number of patients</th>
<th>Effect</th>
<th>Quality</th>
<th>Importance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Absolute (95% CI)</td>
<td>Provision of hearing aid or assistive listening device</td>
<td>No hearing aid or assistive listening device</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of studies</td>
<td>Study design</td>
<td>Risk of bias</td>
<td>Inconsistency</td>
<td>Indirectness</td>
</tr>
</tbody>
</table>

**Social function** (follow up 3–4 months; assessed with Hearing Handicap Inventory; lower score = better performance)

<table>
<thead>
<tr>
<th></th>
<th>randomized trials</th>
<th>serious a</th>
<th>serious b</th>
<th>serious c</th>
<th>not serious</th>
<th>none</th>
<th>106</th>
<th>111</th>
<th>MD 33.4 higher (27.2 higher to 39.6 higher)</th>
<th></th>
</tr>
</thead>
</table>
| **Depression** (follow up 4 months; assessed with Geriatric Depression Rating Scale; lower score = better performance)

<table>
<thead>
<tr>
<th></th>
<th>randomized trials</th>
<th>not serious</th>
<th>not serious</th>
<th>serious d</th>
<th>serious e</th>
<th>none</th>
<th>95</th>
<th>99</th>
<th>MD 0.8 higher (0.09 higher to 1.5 higher)</th>
<th></th>
</tr>
</thead>
</table>

(continued next page)
<table>
<thead>
<tr>
<th>Communication (follow up 4 months; assessed with Quantified Denver Scale; lower score = better performance)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
</tr>
</tbody>
</table>

a Risk of bias: Downgraded once as low to follow-up and intention to treat analysis was not described clearly in Yueh 2001 trial.
b Inconsistency: Downgraded once as substantial heterogeneity was observed (Chi² = 6.14, df = 1 (P= 0.01); I² = 84%. No subgroup analysis was performed and we were not able to explain the heterogeneity.
c Indirectness: Downgraded once as trial participants were mostly white male veterans in one trial and in other restricted to patient who are eligible for free hearing aids
d Indirectness: Downgraded once as participants in the trial were mostly white male veterans
e Imprecision: Downgraded once as sample size was small (smaller than 200)
**GRADE table 3: Self-management support compared with control (alternative interventions)**

**Author:** WHO systematic review team  
**Date:** Between 1st October and 15th November 2015  
**Question:** Self-management support interventions compared with alternative interventions that control for other elements delivery method/pattern for adults with hearing loss who use hearing aids  
**Setting:** Hospital  

<table>
<thead>
<tr>
<th>Quality assessment</th>
<th>Number of patients</th>
<th>Effect</th>
<th>Quality</th>
<th>Importance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of studies</td>
<td>Study design</td>
<td>Risk of bias</td>
<td>Inconsistency</td>
<td>Indirectness</td>
</tr>
<tr>
<td>Quality of life (follow-up 12 months; assessed with validated self-report measures (WHO); lower score = better performance)</td>
<td>1</td>
<td>randomized trials</td>
<td>serious *</td>
<td>not serious</td>
</tr>
<tr>
<td>Self-reported hearing handicap (follow-up 12 months; assessed with validated self-report measure (HHIE); lower score = better performance)</td>
<td>2</td>
<td>randomized trials</td>
<td>serious d</td>
<td>not serious</td>
</tr>
</tbody>
</table>

(continued next page)
### Use of verbal communication strategy

<table>
<thead>
<tr>
<th></th>
<th>randomized trials</th>
<th>serious →</th>
<th>not serious</th>
<th>not serious</th>
<th>serious ↔</th>
<th>none</th>
<th>26</th>
<th>26</th>
<th>MD 0.72 higher (0.21 higher to 1.23 higher)</th>
<th>●●●○○</th>
<th>IMPORTANT</th>
</tr>
</thead>
</table>

MD – mean difference; RR – relative risk

- **a** Risk of bias: Downgraded once as outcome assessor were not masked due to the nature of the intervention.
- **b** Indirectness: Downgraded once as trial participants were mainly military veterans. Therefore, generalising the evidence to other populations is questionable.
- **c** Imprecision: Downgraded once as sample size was small (less than 200).
- **d** Risk of bias: Downgraded once as outcome assessor was masked in one of the included trials.
- **e** Imprecision: Downgraded once as sample size was small (less than 200).
- **f** Risk of bias: Downgraded once as allocation was unclear.
- **g** Imprecision: Downgraded once as sample size was small (less than 200).
### Part 2: From evidence to recommendations

#### Summary of evidence

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Effect size</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Screening for hearing loss vs. no screening</strong></td>
<td>RR 2.28 (1.41 to 3.68) Favours Intervention LOW</td>
</tr>
<tr>
<td><strong>Screening and provision of hearing aid or assistive listening device vs. no hearing aid or assistive listening device</strong></td>
<td>MD 33.4 higher (27.2 higher to 39.6 higher) Favours intervention VERY LOW</td>
</tr>
<tr>
<td><strong>Self-management support interventions vs. alternative interventions</strong></td>
<td>MD 0.8 higher (0.09 higher to 1.5 higher) Favours intervention LOW</td>
</tr>
<tr>
<td><strong>Use of hearing aid</strong> GRADE table 1; Yueh et al. (10)</td>
<td>RR 2.28 (1.41 to 3.68) Favours Intervention LOW</td>
</tr>
<tr>
<td><strong>Social and emotional function (HHIE score)</strong> GRADE table 2; Mulrow et al. (12) and Yueh et al. (11)</td>
<td>MD 0.8 higher (0.09 higher to 1.5 higher) Favours intervention LOW</td>
</tr>
<tr>
<td><strong>Depression (GDS)</strong> GRADE table 2; Mulrow et al. (12) and Yueh et al. (11)</td>
<td>MD 0.8 higher (0.09 higher to 1.5 higher) Favours intervention LOW</td>
</tr>
<tr>
<td><strong>Use of verbal communication strategy</strong> GRADE table 2; Mulrow et al. (12) and Yueh et al. (11)</td>
<td>MD 0.8 higher (0.09 higher to 1.5 higher) Favours intervention LOW</td>
</tr>
</tbody>
</table>

(continued next page)
Evidence profile: hearing loss

<table>
<thead>
<tr>
<th>Quality of life</th>
<th>–</th>
<th>–</th>
<th>MD 9.1 lower (21.33 lower to 3.13 higher) VERY LOW</th>
</tr>
</thead>
<tbody>
<tr>
<td>GRADE table 3; Barker et al. (13)</td>
<td>–</td>
<td>–</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Self-reported hearing handicap</th>
<th>–</th>
<th>–</th>
<th>MD 12.8 lower (23.11 lower to 2.48 lower) Favours intervention LOW</th>
</tr>
</thead>
<tbody>
<tr>
<td>GRADE table 3; Barker et al. (13)</td>
<td>–</td>
<td>–</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Use of verbal communication strategy</th>
<th>–</th>
<th>–</th>
<th>MD 0.72 higher (0.21 higher to 1.23 higher) Favours intervention LOW</th>
</tr>
</thead>
<tbody>
<tr>
<td>GRADE table 3; Barker et al. (13)</td>
<td>–</td>
<td>–</td>
<td></td>
</tr>
</tbody>
</table>

Evidence-to-recommendations table

<table>
<thead>
<tr>
<th>Problem</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Is the problem a priority?</td>
<td>One-third of older people aged 65 years and over live with some degree of hearing loss. In older people, hearing loss is strongly associated with reduced functional ability, social isolation, depression, cognitive decline, poor quality of life, and need for formal and informal care services. Therefore, provision of screening and adequate services at primary care or community setting is essential.</td>
</tr>
</tbody>
</table>

Yes  No  Uncertain
✓
<table>
<thead>
<tr>
<th>Problem</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do the desirable effects outweigh the undesirable effects?</td>
<td>Yes  No  Uncertain</td>
</tr>
<tr>
<td></td>
<td>There is very limited, low quality evidence that suggests that case-finding for hearing loss improves the use of hearing aids among older people with hearing loss. One randomized controlled trial that enrolled 2,305 participants found that screening was associated with a significant increase in hearing aid use at one year compared with no screening.</td>
</tr>
<tr>
<td></td>
<td>There is limited low quality evidence on the effectiveness of case-finding through targeted screening and provision of hearing aids for older adults with hearing loss. Two trials that investigated the immediate provision of hearing aids, after screening for hearing loss, found significant and considerable improvements in hearing-related outcomes. However, these findings came from studies that recruited mostly Caucasian male veterans. Participants in the intervention groups qualified to receive free hearing aids.</td>
</tr>
<tr>
<td></td>
<td>There is limited low quality evidence to suggest that a self-management support intervention is effective in improving uptake or use of hearing aids in older adults with hearing loss. However, the effect sizes were small and not clinically significant, and the overall sample size was small.</td>
</tr>
<tr>
<td></td>
<td>We identified no studies on the harms associated with the screening or provision of hearing aids for hearing loss in older people. Harms are unlikely to be greater than minimal because screening and confirmatory testing are non-invasive and treatment with hearing aids is not associated with significant harms.</td>
</tr>
</tbody>
</table>

(continued next page)
### Values and preferences/acceptability

<table>
<thead>
<tr>
<th>Question</th>
<th>Major variability</th>
<th>Minor variability</th>
<th>Uncertain variability</th>
<th>✓</th>
</tr>
</thead>
<tbody>
<tr>
<td>Is there important uncertainty or variability about how much people value the options?</td>
<td></td>
<td></td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Is the option acceptable to key stakeholders?</td>
<td></td>
<td></td>
<td></td>
<td>✓</td>
</tr>
</tbody>
</table>

**Explanation**

Hearing loss has a dramatic impact on both the quality of life and ability to function in older adults. Case-finding and provision of care, and supportive education interventions to promote the use of hearing aids may have a positive impact on older people who adhere to the use of hearing aids. Therefore, the GDG believes that this recommendation is likely to be valued by older people with hearing loss and stakeholders.

### Feasibility/resource use

<table>
<thead>
<tr>
<th>Question</th>
<th>Major variability</th>
<th>Minor variability</th>
<th>Uncertain variability</th>
<th>✓</th>
</tr>
</thead>
<tbody>
<tr>
<td>How large are the resource requirements?</td>
<td></td>
<td></td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Is the option feasible to implement?</td>
<td></td>
<td></td>
<td></td>
<td>✓</td>
</tr>
</tbody>
</table>

**Explanation**

Most of the interventions evaluated in the trials were resource intensive. Screening and provision of hearing aid technology require economic and human resources (training) that might not readily available in all countries. No data were obtained on the rates of hearing aid use in low- and middle-income countries where access to hearing aid technology presents more of a challenge. The GDG believes that it is feasible to implement community case-finding and provision of hearing aids at primary care or community level.

(continued next page)
<table>
<thead>
<tr>
<th>Equity</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Would the option improve equity in health?</td>
<td>The provision of, or prescription for, hearing aids already exists in clinical practice in most countries. However, in low- and middle-income countries there is a large service gap among older people because many of them have difficulties in accessing the hearing health services. The GDG firmly believe that promoting community case-finding and immediate provision of hearing aids is likely to reduce inequality in care services.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
<th>Uncertain</th>
</tr>
</thead>
<tbody>
<tr>
<td>✔️</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Guideline development group recommendation and remarks

**Recommendation**

Screening followed by provision of hearing aids should be offered to older people for timely identification and management of hearing loss.

*Strength of the recommendation: Strong*

*Quality of evidence: Low*

**Remarks**

- Due to the paucity of the evidence, the direct benefit of community case finding through targeted screening for hearing loss among older people is unclear.
- Hearing aids should only be fitted after an audiometric assessment.
- Treatable ear conditions/medical pathologies should be ruled out before amplification devices are offered.
- A thorough ear examination is essential before undertaking hearing-aid fitting, including ear wax removal.
- The hearing aid should be appropriate for the person with hearing loss and should be properly fitted.
- The hearing aids recommended should be in line with the WHO’s rehabilitation guidelines and preferred assistive product profile.
- Close attention should ensure that instrument cases do not cause skin abrasion or irritation with long-term usage.
- A referral should be made if the prospective user has aural discharge, pain or discomfort in the ear, acute or chronic dizziness, unilateral hearing loss, or sudden onset of severe tinnitus.
- Hearing-aid provision should be accompanied by follow-up services and easy access to services for replacement of batteries, ear moulds, and maintenance and repair of hearing aids.
- Self-support educational intervention should be considered when administering hearing aids to older people with hearing loss.
References

5. Davis ADKA. Epidemiology of Aging and Hearing Loss Related to Other Chronic Illnesses In: Hearing Care for Adults 2009.
Annex 1: Search strategy (MEDLINE and Embase 2015)

1. exp randomized controlled trial/
2. exp randomization/
3. exp double blind procedure/
4. exp single blind procedure/
5. random$.tw.
6. or/1-5
7. (animal or animal experiment).sh.
8. human.sh.
9. 7 and 8
10. 7 not 9
11. 6 not 10
12. exp clinical trial/
14. ((singl$ or doubl$ or trebl$ or tripl$) adj3 (blind$ or mask$)).tw.
15. exp placebo/
16. placebo$.tw.
17. random$.tw.
18. exp experimental design/
19. exp crossover procedure/
20. exp control group/
21. exp latin square design/
22. or/12-21
23. 22 not 10
24. 23 not 11
25. exp comparative study/
26. exp evaluation/
27. exp prospective study/
28. (control$ or prospectiv$ or volunteer$).tw.
29. or/25-28
30. 29 not 10
31. 30 not (11 or 23)
32. 11 or 24 or 31
33. exp hearing test/
34. ((hear or hearing$) adj5 (screen* or assess* or test* or diagnos* or surveill*)).tw.
35. hearing adj1 aid.tw
36. (assistive adj 1(listening or device)).tw
37. or/33-36
38. exp aged/
39. exp senescence/
40. exp elderly care/
41. (old$ adj5 (age$ or people or person$)).tw.
42. (geriatric$ or elderly or senior$).tw.
43. or/38-42
44. 32 and 47 and 43
Annex 2: PRISMA² flow diagram for hearing screening and referral

- Identified
  - Records identified through database searching (n = 1780)
  - Additional records identified through other sources (n = 1)
- Screened
  - Records after duplicates removed (n = 1781)
- Eligible
  - Records screened (n = 1781)
  - Full-text articles assessed for eligibility (n = 10)
- Included
  - Systematic reviews included (n = 1)
  - Additional randomized controlled trials included in quantitative synthesis (meta-analysis) (n = 4)

Records excluded (n = 1771):
- Wrong intervention: 1230
- Wrong study design or publication type: 139
- Conference abstract: 143

Full-text articles excluded, with reasons (n = 3):
- Outcome not reported (n = 2)
- Target population under 60 years of age

² Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA). For more information: http://www.prisma-statement.org