Screening adults aged 50 years or older for hearing loss: a review of the evidence for the US preventive services task force
Chou R, Dana T, Bougatsos C, Fleming C, Beil T

CRD summary
This updated review concluded that the evidence for benefits and harms of screening and treatments for hearing loss was limited and additional research is needed in adults aged 50 years and over in primary care settings. This was a generally well-conducted review and the authors’ conclusions appropriately reflect the limitations of the evidence.

Authors’ objectives
To update a previous evidence review on screening, diagnosis and treatment of hearing loss in adults aged 50 years or older in primary care settings.

Searching
MEDLINE (1950 to July 2010) and the Cochrane Library (second quarter of 2010) were searched to identify relevant English language articles to update the 1996 review (see Other Publications of Interest). Search terms were reported. Reference lists of relevant articles were manually searched. Experts in the field were contacted.

Study selection
Cross-sectional and cohort studies comparing the diagnostic accuracy of screening tests (with a reference standard) to screen adults aged 50 years or more without diagnosed hearing loss were eligible for inclusion. Eligible studies were required to compare screening tests used, available or feasible in primary care settings. Randomised controlled trials (RCTs) and controlled observational studies were also eligible if they assessed the safety and efficacy of amplification treatment with hearing aids or assistive listening devices for the treatment of sensorineural hearing loss or presbycusis, in the same population and setting. Patients with congenital hearing loss, conductive hearing loss, sudden hearing loss, and hearing loss due to recent occupational or other exposure were excluded.

Outcomes of interest were hearing-related quality of life and function, and adverse effects of screening and treatment (eg. false-positive results, labelling, anxiety).

Included studies were of patients aged between 42 and 99 years (where reported). Studies were population-based or patients were recruited from: a Veterans Affairs medical centre; primary care or community based setting; speciality or other high-prevalence setting; or nursing-homes. Screening methods included clinical tests (e.g. detection of a whispered voice, finger rub or watch tick), single-question screening (e.g. Do you have difficulty with your hearing?), hearing questionnaires (e.g. the Hearing Handicap Inventory for the Elderly-Screening, HHIE-S), and hand-held audiometric devices (AudioScope). Most diagnostic studies used pure-tone audiometry as the reference standard. Treatments included hearing aids and assistive listening devices. General quality of life or function was also measured as an outcome.

Two reviewers screened studies for inclusion.

Assessment of study quality
Two reviewers independently assessed the quality of the studies, based on study design, according to previously published criteria (US Preventive Services Task Force). Each study was rated as ‘good’, ‘fair’, or ‘poor’ quality according to different definitions for different study designs (as defined in the review). Discrepancies were resolved through discussion and consensus.

Data extraction
One reviewer extracted outcome data and a second reviewer checked the data for accuracy. Data were extracted from studies of diagnostic accuracy to calculate median sensitivity, specificity, and positive and negative likelihood ratios for detecting hearing loss of more than 25dB and more than 40dB, along with their associated ranges or 95% confidence
intervals (CIs). Diagnostic odds ratios (DORs) and their 95% confidence intervals were also calculated. For diagnostic studies reporting accuracy based on more than one definition of hearing loss, median values were estimated in accordance with the Ventry and Weinstein criteria (for more than 40dB hearing loss), the Speech Frequency Pure-Tone Average criteria (for more than 25dB hearing loss) or other definitions similar to those used by other relevant studies.

Methods of synthesis
Due to the limited number of RCTs and the clinical and methodological heterogeneity among diagnostic accuracy studies, data were presented as a narrative synthesis. Some findings were presented in tables by population setting.

Results of the review
Five RCTs (four unblinded randomised and one cross-over; overall quality fair) and 20 observational studies (all cross-sectional; overall quality good) were included in the review.

Screening (one RCT and 20 observational studies)
One fair quality RCT (n=2,305 participants) found that screening using the AudioScope and/or Hearing Handicap Inventory for the Elderly-Screening (HHIE-S) for hearing loss resulted in a statistically significantly greater use of hearing aids at one year (AudioScope 6.3%, HHIE-S 4.1%, combined 7.4%) compared with no screening (3.3%) (p=0.03 for between-group differences). Post-hoc stratified analysis showed that hearing aid use was greater among patients with perceived hearing loss at baseline compared with those without perceived hearing loss. There was no statistically significant difference in the proportion of patients experiencing a minimum clinically important difference in hearing-related function, measured using the Inner Effectiveness of Aural Rehabilitations scale.

Twenty studies (n=7,946 participants; range 30 to 3,471) assessed the diagnostic accuracy of tests; seven were rated as good quality and 13 as fair. Six good quality studies directly compared different screening tests. One good quality study found that the watch-tick and finger-rub tests had significantly stronger positive likelihood ratios (watch-tick test positive LR 70, 95% CI 4.4 to 1,120; finger-rub test positive LR 10, 95% CI 2.6 to 43) and similar negative likelihood ratios (watch-tick negative LR 0.57, 95% CI 0.49 to 0.66; finger-rub LR 0.75, 95% CI 0.68 to 0.84) compared with the whispered voice test (positive LR 2.3, 95% CI 1.3 to 3.8; negative LR 0.73, 95% CI 0.61 to 0.87) or a single screening question (positive LR 2.5, 95% CI 1.0 to 5.9, negative LR 0.82, 95% CI 0.68 to 0.99). There was a consistent trade-off between lower sensitivity and higher specificity for the HHIE-S compared with a single screening question (three studies), reflecting stronger positive likelihood ratios and weaker negative likelihood ratios.

Studies comparing screening tests with a control also provided evidence that screening tests are useful for identifying patients at higher risk for hearing loss (see other Publications of Related Interest for full 2011 report results).

Diagnostic odds ratios and other results were reported in the review.

Hearing loss treatment (four RCTs; n=571 participants; one good, two fair, and one poor quality)
One good quality RCT found that immediate hearing aids compared with waiting list control groups improved hearing-specific quality of life and communication difficulties in veterans up to 12 months, but no difference was reported for general quality of life. Two fair quality RCTs found no difference between treatment and control groups in function or quality of life. A fourth RCT did not report results clearly.

No evidence was identified on the adverse effects of hearing loss screening or treatment of hearing loss.

Authors’ conclusions
The evidence for benefits and harms of screening and treatments for hearing loss was limited. Additional research is needed to assess the effects of screening for hearing loss compared with no screening on health outcomes in adults aged 50 years and over, and to confirm benefits of treatment under conditions likely to be encountered in most primary care settings.

CRD commentary
The review question and inclusion criteria were clearly defined. The literature search was satisfactory and included a
search for ongoing studies. However, as the search included only English language studies, language bias may have been introduced, which the authors acknowledged. Each stage of the review process was undertaken in duplicate, which reduced the potential for reviewer error and bias.

Study quality was assessed using appropriate criteria. Only a small number of RCTs were identified, with only one considered to be of good quality. Given the clinical and methodological heterogeneity among studies, a narrative synthesis was appropriate. The authors acknowledged certain limitations with the review, including potentially limited generalisability resulting from the recruitment of participants largely from speciality settings. It was also noted that some confidence intervals were very wide for some results, effecting the robustness of the individual findings.

Despite the limitations with the included studies, this was a generally well-conducted review and the authors’ conclusions appropriately reflect the limitations of the evidence.

**Implications of the review for practice and research**

**Practice:** The authors stated that, as a number of studies were conducted in high-prevalence populations recruited from speciality settings, the generalisability of the findings to primary care settings may be limited.

**Research:** The authors stated that further research is needed on the effectiveness of screening in primary care settings, to identify the optimal age at which to start screening and to identify the severity of hearing loss that is most likely to benefit from hearing aids. Research is also needed to identify effective methods to enhance follow-up rates and uptake of recommended treatments after screening.

**Funding**


**Bibliographic details**


**Original Paper URL**

http://www.annals.org/content/154/5/347.abstract

**Additional Data URL**


http://www.uspreventiveservicestaskforce.org/uspstf/uspshear.htm

**Other publications of related interest**


**Indexing Status**

Subject indexing assigned by CRD

**MeSH**

Adult; Aged; Hearing Loss; Hearing Tests; Humans; Mass Screening; Middle Aged

**AccessionNumber**

12011001280
Date bibliographic record published
02/03/2011

Date abstract record published
09/03/2011

Record Status
This is a critical abstract of a systematic review that meets the criteria for inclusion on DARE. Each critical abstract contains a brief summary of the review methods, results and conclusions followed by a detailed critical assessment on the reliability of the review and the conclusions drawn.