INTRODUCTION

• Using a probe-tube microphone to measure and adjust the real-ear performance of the hearing aid to match the prescription target is recommended and widely used in clinical practice [1].
• Hearing aid fitting software can approximately match the amplification characteristics of the hearing aid to the prescription without real-ear measurements (REMs), but using REM improves the match to the prescribed target [2].
• What is unclear is if the improved match results in a better patient outcome.

Aim

• The objective of this review was to determine whether the use of REM improves patient outcomes in adult hearing aid users.

METHODS

• The protocol for this systematic review was registered with the International Prospective Register of Systematic Reviews (PROSPERO, CRD42020166074) and published in BMJ Open [3].

Information sources

• Studies were identified using a systematic search strategy of the following databases: COCHRANE Library, Embase, Emscare, MEDLINE, PsycINFO, PubMed, and Web of Science.
• The search strategy was developed by a medical information specialist.

Eligibility criteria

• Adults (≥18 years old) with any specified degree of sensorineural or mixed hearing loss.
• The studies should compare REM fitting to the initial fit provided by the manufacturer’s fitting software.
• Hearing-specific health-related QoL was the primary outcome
• Secondary outcomes included self-reported listening ability, speech recognition in quiet or noisy setting, sound quality and preference.

Quality appraisal

• The risk of bias in the studies was evaluated using Down and Black’s checklist [4]. The quality of the overall evidence was assessed using the Grading of Recommendations, Assessment, Development and Evaluations tool (GRADE) [5].

RESULTS

Search and selection of studies

• After assessing more than 1,420 records from seven databases, six experimental studies (published between 2012 and 2019), met the inclusion criteria; five were included in the meta-analyses.

Outcomes

• Our choice of primary outcome was not reported in any of the studies. Of the secondary outcomes, the following were reported:

  a) Self-reported listening ability
  • There was a small but statistically significant positive effect of REM, compared to the manufacturer’s initial fit (standardized mean difference (SMD): 0.22; Figure 1). The quality of evidence, as measured with GRADE, was judged to be moderate due to concerns over indirectness (i.e., short follow-up periods) and imprecision (i.e., small sample sizes).

  b) Speech intelligibility in quiet and noisy settings
  • There were moderate and small statistically significant positive effects of REM on speech intelligibility in quiet (SMD: 0.59) and in noise (SMD: 0.15). The evidence, for both outcomes, were judged to be of low quality due to concerns over indirectness, risk of bias (i.e., plausible carryover effect) and imprecision (Figure 2).

  c) Sound quality
  • There was a moderate but statistically non-significant positive effect of REM on sound quality (SMD = 0.51). The overall quality of evidence was downgraded to very low due to concerns over indirectness, risk of bias and imprecision (Figure 3).

  d) Preference
  • There was a moderate and statistically significant positive effect of REM, compared to the manufacturer’s initial fit (proportion difference: 52.2%). The evidence was judged to be of high quality because there are no serious limitations (Figure 3).

Fig. 1. Forest plot comparing self-reported listening ability with REM fitting vs initial fit. The size of the square denotes the weight of each study and the whiskers represent the 95% confidence interval (CI) around the effect size. Diamonds represent the pooled effect size and its 95% CI; N* = inverse-variance weighting.

Fig. 2. Forest plot comparing speech intelligibility in quiet (top panel) and noisy (bottom panel) settings with REM fitting vs initial.

Fig. 3. Forest plot comparing sound quality (top panel) and preference (bottom panel) with REM fitting vs initial.

Take home messages

• The review, the first on this topic, identified a small number of studies with limited numbers of participants.
• The quality of evidence range from high to very low, but favoured REM fittings for all outcomes.
• The statistical findings are encouraging but it is currently unclear if these are meaningful to the patient because minimum clinically important differences for the outcomes have yet to be established.
• This paper is currently under review for publication in Trends in Hearing.

REFERENCES


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