



<b>Title</b>	<b>The Effectiveness and Cost Effectiveness of Cochlear Implants for Severe to Profound Deafness in Children and Adults: A Systematic Review and Economic Model</b>
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<b>Reference</b>	Volume 13.44, ISSN 1366-5278. <a href="http://www.hta.ac.uk/project/1593.asp">www.hta.ac.uk/project/1593.asp</a>

## Aim

To investigate the clinical and cost effectiveness of providing: 1) a unilateral cochlear implant for severely to profoundly deaf people (using or not using hearing aids), and 2) a bilateral cochlear implant for severely to profoundly deaf people with a single cochlear implant (unilateral or unilateral plus hearing aid).

## Conclusions and results

The clinical effectiveness review included 33 papers, of which only 2 were RCTs. They used 62 different outcome measures and overall were of moderate to poor quality. All studies in children comparing one cochlear implant with nontechnological support or an acoustic hearing aid reported gains on all outcome measures, some demonstrating greater gain from earlier implantation. The strongest evidence for an advantage of bilateral over unilateral implantation was for understanding speech in noisy conditions (mean improvement 13.2%,  $p < 0.0001$ ); those receiving a second implant earlier made greater gains. Comparison of bilateral with unilateral cochlear implants plus an acoustic hearing aid was compromised by small sample sizes and poor reporting, but benefits were seen with bilateral implants. Cochlear implants improved children's quality of life, and those who were implanted before attending school were more likely to do well academically and attend mainstream education than those implanted later. Adults derived greater benefit from cochlear implants than from nontechnological support in terms of speech perception. Increased age at implantation may reduce effectiveness, and a negative correlation exists between duration of deafness and effectiveness. Speech perception measures all showed benefits for cochlear implants over acoustic hearing aids (eg, mean increase in score of 37 points in noisy conditions [ $p < 0.001$ ] with BKB sentences); however, prelingually deafened adults benefited less than those postlingually deafened (mean change scores 20% versus 62%). For unilateral versus bilateral implantation, benefits in speech perception were significant in noisy conditions on all measures (eg, 76% for HINT sentenc-

es [ $p < 0.0001$ ]). Quality of life measured with generic and disease-specific instruments or by interview mostly showed significant gains or positive trends from cochlear implants.

## Recommendations

See Executive Summary link at [www.hta.ac.uk/project/1593.asp](http://www.hta.ac.uk/project/1593.asp).

## Methods

See Executive Summary link at [www.hta.ac.uk/project/1593.asp](http://www.hta.ac.uk/project/1593.asp).

## Further research/reviews required

1) Determination of the level of residual hearing remaining before it becomes cost ineffective to provide an implant rather than an acoustic hearing aid. 2) Definition of the earliest age at which the implantation of a congenitally deaf child is safe and effective. 3) Investigation of the utility gain for children from bilateral compared with unilateral implantation. 4) Studies in children and adults enabling mapping (ie, reliable prediction) from measures of speech perception and production and hearing to validate generic utility assessment instruments. 5) Studies on employment prospects in adults or children using cochlear implants compared to employment prospects in profoundly/severely deaf people. 6) Larger studies with longer follow-up, using standard measures for outcomes and quality of life impact, and recording full data on known covariates of postimplantation speech and quality of life outcomes.