

Changes in knowledge and beliefs toward cochlear implants after an awareness campaign

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Abstract. *Objective:* The aim of the study was to assess whether an online media awareness campaign had any impact on attitudes or knowledge of cochlear implants among otorhinolaryngologists in Austria, Germany, Sweden, and the UK. *Method:* A series of promotional banners for cochlear implants were placed in a variety of online mainstream media and medical magazines. A total of 240 otorhinolaryngologists were surveyed using a custom-made online questionnaire, and data were collected before and 1 year after the online awareness campaign and compared.

Results: The online awareness campaign had little impact on the attitudes of otorhinolaryngologists. Median click rates for the promotional banners placed on medical websites were approximately 0.17%. This was higher than for the more general publications, but this did not translate into improved awareness.

Conclusions: The online campaign did not have an impact on awareness in this group. Efforts should be made to encourage otorhinolaryngologists to make better use of alternative methods of providing updates and training. It is important that they are aware of cochlear implant technology so that they can inform patients who are suitable for cochlear implantation and advise them appropriately.

Introduction

Unilateral cochlear implantation is accepted as an effective and cost-effective treatment for severe to profound bilateral deafness in adults.¹⁻³ In developed economies, funding for the treatment is available through either private health insurance or the state, but the number of adults receiving an implant is less than 10% of the severe to profoundly deaf population.^{4,5} This is in stark contrast to the high utilization rates of hearing aids in adults with severe to profound hearing loss⁶ and paediatric cochlear implant (CI) utilization, which ranges from 50% - 97% (USA and Australia).^{5,7} This leads us to question why adult implantation rates are so low.

Factors identified as barriers to hearing rehabilitation in general include financial limitations, stigma of hearing devices, inconvenience, competing chronic health problems, and unrealistic expectations.⁸ Sorkin⁹ suggested that additional bar-

riers to cochlear implantation may exist, including low awareness of the benefits of CIs among the population, low awareness among health-care professionals, the lack of specific referral pathways, and political issues relating to the Deaf Community. Good knowledge of the risks versus benefits is especially important for cochlear implantation, as it requires an invasive surgical procedure to insert the electrode array into the cochlea, in contrast to a hearing aid that can be fitted at any time. Therefore, the professionals are beholden to provide accurate information and enable potential patients to balance the risks and make an informed choice. It would be reasonable to assume that professionals, such as audiologists and otorhinolaryngologists, are well-informed about the benefits and limitations of a CI and are able to refer appropriately. However, Chundu and Buhagiar¹⁰ reported that less than half of the audiologists they surveyed were confident that they knew when to refer a patient for a CI assessment. D'Haese et al.¹¹ took a random sample of doctors

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Table 1

The medical or health websites chosen to host the banners. Shaded boxes indicate where adverts were run twice, with the second run 6 months after the first. The type of website is indicated in parentheses

netdokter.at (health magazine)	bmj.com (medical forum)	audiology-worldnews.com (medical magazine)
hno-arzt.at (private health centre)	netdoctor.co.uk (health magazine)	
ärztezeitung.de (medical magazine)	netdokter.se (health magazine)	
doccheck.de (medical forum)	lakartidningen.se (health magazine)	
netdokter.de (health magazine)	dn.se/livsstil/halsa/ (health magazine)	
springermedizin.de (medical magazine)	dagensmedicin.se (medical magazine)	
hearinglink.org (charity)	medicinskaccess.se (medical magazine)	

with ear, nose, and throat (ENT) specialist training and surveyed their referral patterns, attitudes, and beliefs towards CIs. Although most were aware that hearing implants and hearing aids were different, there was some confusion over the need to still wear and maintain an external speech processor with a CI.

Evidence has shown that uninformed professionals can act as an additional barrier to implantation, and improved education of audiologists and ENT specialists can greatly improve referral rates.^{12,13} The goal of this study was to address the barrier to seeking treatment that uninformed professionals may present by providing access to accurate information on CIs via an online campaign. A series of banners showing an image associated with CIs placed in a variety of online mainstream media and medical journals/magazines intended to cover a broad range of people, including but not exclusive to otorhinolaryngologists. This paper reports the results from the follow-up questionnaire administered to otorhinolaryngologists 1 year after the baseline data were collected. The aim was to assess whether the campaign had any impact on their attitudes or knowledge, with the ultimate goal of influencing their actions by increasing referral rates for CI assessment, leading to higher implantation rates.

Method

A series of banners were placed in a variety of online media sources in the UK, Sweden, Germany, and Austria. The adverts were paid for by MED-EL GmbH, but images were chosen that apply to all companies. An example is given in Figure 1. If the banner was 'clicked', the person was taken through to the country-specific MED-EL website,

where they could access the information about the implantable devices that interested them. The sites chosen ranged from medical news forums, such as netdoctor (www.netdoctor.co.uk), to mainstream newspaper titles, such as *The Times* and *Die Welt*. Only online versions were targeted. A list of the medical publications chosen is given in Table 1. The adverts ran from September 2013 for 2 weeks to 3 months depending on the media source. A second campaign was run in February 2014 for 1-2 months. The percentage of people who clicked on each banner was calculated after each advertising run, giving a click rate for each media source. It was not possible to monitor which pages were accessed on the MED-EL corporate website once it was reached or to determine who had clicked on the banner.

Baseline data were collected at the start of the study using an online questionnaire. Three months after the campaign, a second independent sample of 50 otorhinolaryngologists was recruited for each participating country and the same online questionnaire repeated. The exception was Sweden, where only 40 otorhinolaryngologists were questioned. The sample was randomly selected from individuals in the Karmasin Motivforschung market research company database. They received no reward for taking part. Individuals were matched to the original sample recruited for the baseline data collection by geographic region only. All subjects were medical doctors with additional ENT specialist training.

The custom questionnaire described in D'Haese et al.¹¹ was emailed in small batches until 50 completed responses were received from each nation. The questionnaire was developed in German and aimed at exploring the beliefs or referral patterns of otorhinolaryngologists in a



Figure 1

Example of a banner placed in the online British Medical Journal

secondary setting. All questions were a closed set, and questions 1 and 9 were answerable on a Likert scale from 1 to 5. The final version of the questionnaire was created by Karmasin Motivforschung, a market research company in Vienna, and had 13 questions translated to produce a validated translation for each nation. Incomplete questionnaires were discarded. Questions 3-7 and 11-12 were excluded from the results because they

queried topics or treatment modalities outside the scope of this article, leaving six questions for analysis. No exclusion criteria were applied other than having access to the internet and being able to complete the questionnaire online.

The questionnaire results were compared to the baseline data collected from 1 June 2013 to 31 July 2013, prior to any advertising. Any significant changes in the data were identified.

Consent and ethics approval

Written consent was obtained from each subject for their data to be included in this study. The study follows the ethical principles laid out in the Declaration of Helsinki.

Statistical analysis

Data were compared across years for questions 1, 2, 8-10, and 13. For questions 1, 9, and 10, the mean value was taken for each category and compared using a two-tailed t test for independent samples. Results were the same when equal variances were assumed as when they were not assumed. The proportions of responses for questions 2 and 8 were compared using a chi-squared test. IBM SPSS Statistics 19 (IBM, Armonk, New York) was used for the t test analyses. The graphs were created and chi-squared tests performed in Microsoft Office Excel 2010 (<http://www.microsoft.com>).

Subjects

From Austria, Germany, and the UK, 50 subjects were recruited from each country, and 40 from Sweden

Results

Question 1: To what extent do you agree with the following statements about hearing implants?

A Likert scale from 1-5 was used where one is 'completely agree' and 5 'completely disagree'. Scores ≤ 3 were taken as agreement and > 3 as disagreement. In Sweden and Austria, there was a significant change in the results, with more agreement that 'Hearing implants are not externally visible' ($p < 0.02$) in Sweden and less agreement that 'Qualitatively (in terms of hearing

Table 2

Mean importance ratings on the Likert scale for the items related to hearing implants in answer to the question, "To what extent do you agree with the following statements about hearing aids/hearing implants?" 1 represents completely agree and 5 completely disagree. The 2013 data are reported in parentheses after the 2014 data. *Significant differences determined by student's t test with p values

	Germany	UK	Austria	Sweden
Hearing implants require regular maintenance and adjustment	2.3 (2.3)	2.5 (2.8)	2.0 (2.0)	2.4 (2.4)
Hearing implants can be a nuisance during physical activity	3.4 (3.0)	3.4 (3.2)	3.4 (3.2)	3.4 (3.5)
Hearing implants are not externally visible	3.2 (3.1)	3.4 (3.5)	3.3 (2.8)	2.9 * (p<0.02) (3.8)
Qualitatively (in terms of hearing sensitivity) there is no difference between hearing aids and hearing implants	4 (4.1)	3.9 (3.8)	3.7*(p<0.01) (2.9)	4.3 (4.4)
Hearing implants are permanently fitted and do not need to be removed before going to bed at night	2.6 (2.7)	2.6 (3.1)	2.6 (2.5)	2.8 (2.3)

sensitivity) there is no difference between hearing aids and hearing implants' ($p<0.01$) in Austria. No other changes in the data were observed. Overall, there was agreement that implants require regular maintenance and that they are permanently fitted and don't need to be removed before bed. There was disagreement that they are a hindrance during physical activity and that there is no difference in sensitivity between hearing aids and hearing implants. There was also disagreement that hearing implants are not externally visible, but not as strongly as would be expected (Table 2).

Question 2: Do you think there is a difference between a hearing aid and a hearing implant?

In the UK, 2% answered 'No' with the other 98% answering 'Yes', slightly lower than 2013 when 100% answered 'Yes'. In Austria, 5% of respondents answered 'No' with 95% answering 'Yes', compared to 8% and 92%, respectively, in 2013. In Germany, 4% of respondents either didn't know or didn't answer and 96% answered 'Yes' in both 2013 and 2014. In Sweden, 95% and 96% answered 'Yes' in 2013 and 2014, respectively, but 4% 'didn't know or didn't answer' in 2014 and 5% answered 'No' in 2013.

Question 8: In instances where in your opinion both hearing aids and hearing implants are suitable, do you recommend a hearing aid or a hearing implant to your patients?

More than 90% of otorhinolaryngologists in Germany, UK, and Sweden would recommend a

hearing aid over an implant in both 2014 and 2013. However, in Austria, 29% would still recommend an implant over a hearing aid in 2014, 10% fewer than in 2013.

Question 9: How important, in your opinion, are the following issues with regard to hearing implants?

Subjects were also asked to give an importance rating on a Likert scale for each aspect from 1 (very important) to 5 (not at all important). All answers had a strong 'very important' response, with the lowest mean value for any answer across all countries of 2.8. The responses were similar regardless of country. There were two changes compared to the 2013 data. In Austria, rehabilitation became marginally more important than in 2013 ($p=0.05$), and in the UK remote fitting and music enjoyment became more important than in 2013 ($p=0.01$ and $p=0.04$).

Question 10: Which aspect with regard to hearing implants is most important, second most important, third most important, etc.

The results did not change from baseline. The aspect of CIs ranked as the most important was 'Rehabilitation' for all countries (Table 3). The least important aspect of CIs was 'Music appreciation' in Germany, Austria, and Sweden. In the UK, 'Remote fitting' was ranked as the least important in both 2014 and 2013.

Question 13: How do you keep abreast of medical issues?

Table 3

The ranked order of each issue listed in the questionnaire with regards to hearing implants. The mean ranked rating of each item was calculated by country, where 1 is the most important and 9 the least important

	Germany	UK	Austria	Sweden
Rehabilitation	1 st	1 st	1 st	1 st
Hearing preservation	2 nd	2 nd	2 nd	2 nd
Electrodes	3 rd	6 th	3 rd	7 th
Atraumaticity	5 th	3 rd	5 th	3 rd
Enhanced music enjoyment	9 th	8 th	9 th	9 th
Remote fitting	7 th	9 th	8 th	8 th
Complete cochlear coverage	4 th	5 th	6 th	5 th
Coding strategy	8 th	7 th	7 th	4 th
Bilateral	6 th	4 th	4 th	6 th

The top two responses remained the same for all countries. Conversations with colleagues or national and international conferences were the top two answers in both 2013 and 2014, except in Germany, where specialist articles or books was highest across both years. Interactive media remained in the bottom half of responses in both years for all countries.

Click rates

The click rates for each media site give a measure of how successful the advertising banners were in getting people onto the MED-EL corporate website. Average values were skewed by outliers, so median values are given. Click rates were high for the medical sites, with median values of 0.18% and 0.16%. These were higher than for the more general publications, which were 0.10% and 0.08% for campaigns 1 and 2, respectively. The Swedish medical magazine site, www.Medicinskaccess.se, was an outlier in both sets of data, with a click rate of 5.6%, as was *Audiology World News*, which had a click rate in the first campaign of 3.5%. The next highest click rates were for netdoctor.de (0.75%) and netdoctor.co.uk (0.5%).

Discussion

The data collected in 2014 showed very little change compared to the 2013 results, and the views of the otorhinolaryngologists across all countries remained largely the same. Question 1 covers the types of issues that may come up in an initial consultation with a patient who is considering a CI. Responses to the statements regarding implants in this question were not as clear as could be

expected, with Likert values falling within the middle of the range for most questions. Implants were still regarded by some as not externally visible and permanently fitted, without the need to remove them at night. This indicates that not all were aware of the basic structure of a CI with a concealed implanted part and an external speech processor, which is worn much like a hearing aid. Without the external speech processor, the CI does not function, and providing reassurance to patients that they can remove the external part of the CI at any time and have the option to return to their non-hearing state could be a key factor in the decision-making process. Conversely, misleading patients that a CI provides an invisible hearing solution, when it currently does not, can also be a hindrance. We would also have expected strong disagreement from all respondents to the statement that there is no difference in hearing sensitivity between and implant and hearing aid. However, there was still a small percentage of respondents who agreed with this statement.

Rehabilitation is a key part of the implantation process and was correctly ranked as the most important issue with respect to CIs, closely followed by hearing preservation. The ability to preserve any remaining hearing in the implanted ear following surgery is hugely reassuring to patients who, in the early days of implantation, were told that they would be unable to wear their hearing aids following surgery.¹⁴ One of the least important aspects of CIs was music appreciation, but music enjoyment was rated as more important in 2014 than in 2013 in the UK and Sweden. Though good speech perception is the primary aim of CI use, the ability of CI users to enjoy music with their implant has become an area of interest.¹⁵ Remote fitting was also ranked

as one of the least important aspects of CIs by all countries. However, there were significant changes in the importance ratings between 2013 and 2014 for remote fitting in the UK. This is another area of current research where CI clinics are struggling to manage the rehabilitation demands of their ever-growing patient group.¹⁶

In Austria, a high percentage (29%) of clinicians would still recommend a hearing implant over a hearing aid (i.e., would recommend the more invasive and resource-intensive option) for cases in which either treatment modality was suitable. This is slightly fewer than reported in 2013 but is concerning, especially as Austria also has the highest percentage of respondents agreeing that there is no difference in hearing sensitivity between a CI and a hearing aid.

When asked, “*How do you keep abreast of medical issues?*” interactive new media (e.g., online lexicons, internet portals) remained in the bottom half of responses in both years for all countries. This presented a problem for a campaign based on the internet and may be why very few significant changes were seen between the two years. It also underscores that interactive new media is a comparatively ineffective way to keep otorhinolaryngologists informed, though it is a very cost-effective and time-efficient way to communicate information. New training methods are required for both knowledge acquisition and surgical training,¹⁷ and the key question is how to get medical professionals to use this medium more. Analyzing the click rates for the banners can provide insight into the effectiveness of the online approach. A standard banner advertisement can expect a click through rate of 0.15%, with higher percentages for media-rich adverts, so the click rates reported here were in line with expectations for the medical industry.¹⁸ The campaign targeted a range of online publications, some of which were aimed at medical professionals. However, the articles in these magazines are not peer-reviewed and, thus, the publications are not given the same weight as a journal. As expected, the medical publications produced higher median click rates than the general media publications. The Swedish medical magazine, www.Medicinskaccess.se, was an outlier in both campaigns, as was Audiology World News, but we are unable to separate the sample into medical and non-medical subjects, so we are limited in the conclusions we can draw

from this data, as we do not know if it was the ENT professionals who were boosting these rates.

The limitations of the study were that the questionnaire was not validated, so its sensitivity to any changes was unknown. A closed set of answers was provided for each question, including ‘other’, but there was no box for open comments, missing the opportunity to collect broader opinions. Using a repeated measures design would have improved the sensitivity of any statistical analysis, but this presents problems with missing data, especially in an online survey of this nature. There was no way of knowing if any of the participants already had an interest in CIs; therefore, bias may have been present in the selected sample. It was also not possible to control for other sources of information that were accessed during the study period. As the industry has become aware of the lack of accurate information in the public domain, many awareness activities have been pursued. Therefore, it is impossible to say if any changes seen were attributable to this campaign alone or an improved profile for CIs in the mainstream media.

Lack of knowledge of CIs among referring otorhinolaryngologists does seem to be an additional barrier to implantation. Much more definitive responses to the questions that a patient might ask at an initial consultation (e.g., “can I take it off”, “will other people be able to see it”, and “will I hear better than with my hearing aid”) are expected. Further training is required to ensure patients get the correct initial information when first considering a CI.

Conclusions

The online awareness campaign had little impact on the attitudes of otorhinolaryngologists. Though the click rates for the promotional banners were in line with expectations, this did not translate into improved awareness. It is essential that otorhinolaryngologists are kept up-to-date with CI technology so that they can appropriately advise their patients who are suitable for cochlear implantation. Efforts should be made to encourage otorhinolaryngologists to make better use of online education material for updates and training.

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