ORIGINAL ARTICLE

Work Activity in Patients Treated With Cochlear Implants

Alicia Huarte, Marta Martínez-López, Raquel Manrique-Huarte, Sandra Erviti, Diego Calavia, Cora Alonso, Manuel Manrique

Departamento de Otorrinolaringología, Clinica Universidad de Navarra, Pamplona, Spain

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Abstract

Introduction: The aim of this study was to determine the impact that the cochlear implant (CI) had in the working life of individuals implanted, using the first version of a questionnaire developed in the cochlear implant program at the University Clinic of Navarre. Its purpose was to demonstrate that the CI significantly affected the working lives of these patients.

Material and methods: This was a retrospection study on a population of 60 patients (mean age, 48 years old) with bilateral profound sensorineural hearing loss treated with CI and to whom a questionnaire on working life satisfaction was given.

Results: Of the patients completing the questionnaire, 94.23% were currently satisfied at work. Almost all of them (93.05%) were more motivated to go to work after the implantation. The majority (79.31%) considered themselves more competent after surgery and device activation. Social relations at work were considered to have improved after cochlear implantation by 67.23% of patients.

Conclusions: The CI provided positive support in the professional sphere as well as in social abilities by improving communication skills of implanted patients. The development of tools to assess the degree of job satisfaction of patients treated with a CI is of great interest.

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Introduction

Adults with hearing loss generally have difficulties maintaining a normal, active working life. Moreover, if their profession entails very demanding communication skill needs (meetings, telephone work, a noisy work environment, etc.), or if their hearing loss affects both ears and is severe-profound, a significant number of these patients may have to adapt or change their job, reduce their working hours or even stop working; in the worst case scenario they might even be dismissed. Similarly, hearing loss of these characteristics might impede the sufferer’s career development or their taking on greater responsibilities in the workplace.

A certain period of time after a cochlear implant (CI) has been placed, these adults can, to a greater or lesser extent, regain their hearing and improve communication with their environment.1,2 These benefits are likely to extend to the workplace, enabling a return to professional activities and even career progression.

At present there are many tools for measuring the outcomes of adults implanted with CI in different environments: spoken-word perception in situations of silence and noise, sound localisation, quality of life questionnaires, etc.3,4 However, our search of the literature identified only one study relating CI and occupation,5 to date there are no materials that examine the degree of satisfaction at work of this population group. We believe that this aspect is relevant, since information could be gathered on how adults implanted with CI are integrating in social and professional activities. This information would provide data of particular relevance for cost-benefit studies and ultimately reveal the impact that this treatment is having on society.

The aim of this study was to explore the impact of cochlear implants on the working life of adults with bilateral severe-profound hearing loss by the application of a first version of a working life satisfaction questionnaire for patients implanted with an IC (WLSCI).

Material and Methods

Questionnaire on Working Life Satisfaction for Patients With Cochlear Implants (WLSCI)

Two types of questionnaire, “retrospective” and “prospective”, were proposed to evaluate the level of working life satisfaction of patients implanted with CI. An early stage, the focus of this study, covered the creation of the first questionnaire, Retrospective Working Life Satisfaction Questionnaire for Patients with Cochlear Implants (WLSCI). This would comprise one part, to be completed from one year after activation of the CI. This study includes a first version of this questionnaire. The “prospective” questionnaire would be completed in a second phase and comprise 2 parts, one to be completed before implantation surgery, once the selection and guidance phase has ended, and the other to be completed a year after activation of the CI.

Subjects

A first evaluation of the rWLSCI retrospectively studies a group of patients who met the following inclusion criteria:

1. CI user, 18 years of age or over at the time of completing the questionnaire.
2. Patient with profound pre or post locutive hearing loss in both years.
3. At least 6 months’ work experience.
4. Willing to take part in the study.
The methodological design was based on each subject being used as their own control.

**Statistical Processing**

A database was set up in the SPSS system, which contained the information gathered in the questionnaire. A purely descriptive statistical study was undertaken.

**Results**

**Retrospective Working Life Satisfaction Questionnaire for Patients With Cochlear Implants (rWLSCI)**

The first version of the rWLSCI is shown. It comprises 2 parts: the first gathers the patients’ demographic and professional data (2 questions) and the second explores the level of satisfaction of the patients treated with CI with their working lives (32 questions). One response option should be chosen for 17 questions (questions 1–12, 14, 28, 31–33), qualitative in type, out of a total of 34 questions. In 14 questions (questions 13, 15–21, 23–27, 30) the response has a numeric value, from a negative score (−5), passing through zero (0), meaning indifference or neither satisfied nor dissatisfied, to a positive score (+5) meaning satisfaction or feeling well-equipped. To 3 questions (questions 22, 29 and 34), the patients give their response in writing, freely and openly.

**Population**

A total of 60 patients were included, 34 males and 26 females, with a mean age of 47.92 years (range: 26–64 years), and a mean period of IC use of 9 years (1–22 years). The causes of hearing loss were: genetic (8), ototoxicity (6), unknown origin (16), postnatal infection (8), otosclerosis (11), trauma (1) and other (10). In the ear contralateral to the implanted ear, 33 did not use another hearing aid, 25 used a hearing aid simultaneously and 2 used an IC. They were all given the rWLSCI questionnaire. Patient recruitment started in September 2013 and ended a year later.

**Results of the Questionnaire**

With regard to the first part of the questionnaire, aimed at analysing demographic and professional aspects, most of the population studied undertook their occupational activity in the service sector and approximately 25% in the construction sector (Fig. 1A). In terms of qualification level, most of the respondents had vocational training; a minority had doctorates (Fig. 1B).

The second part of the RWLSCI referred to employment status. At the time of completing the questionnaire, of the 60 respondents, 50 (83.3%) were actively employed, 12 (20%) had found employment after implantation of the CI, of whom 5 (41.4%) thought that this was thanks to the CI. Eleven point six percent answered that they worked part time and 71.67% full time. By contrast, 10 (16.7%) were not in employment at the time of completing the questionnaire, although they had been working at the time they were implanted. Two (20%) of them reported that the main reason for their dismissal was the implantation of the CI, due to the excessive medical appointments resulting in sick leave. This group had been unemployed for 3 months (20%), 6 months (20%), 24 months (20%) or more than 24 months consecutively (40%) (Fig. 2).

The results of the qualitative and numerical questions are shown in Figs. 3 and 4. Ninety-four point 2 percent of the patients stated that they were satisfied with their work, 81.6% and felt that they were able to meet their employment obligations. Ninety-three point five % of the patients felt more motivated to go to work after having their CI implanted, 79.3% felt more competent to work. More than

![Figure 1](image-url)  (A) Information on the professional fields of the respondents. (B) Classification of the different educational levels of the implanted patients who completed the questionnaire. VT: vocational training.
half of the respondents (58.62%) indicated that they were better able to tackle some of the more arduous elements of communication at work, such as telephone tasks. From analysis of the questions presented previously (from 16 to 20), we deduced that the CI conferred the patients with better skills and satisfaction with their work.

The block of questions from 23 and 27 analyses aspects of discrimination at work caused by deafness or the treatment patients received with the CI. Twenty-six point three percent indicated that their deafness proved an obstacle to obtaining promotions at work and another 50.8% indicated that it was not relevant. In general, 81.4% of the patients treated with CI did not consider that this affected potential changes in their employment position. However, 11.11% were optimistic that they would receive a promotion after their implantation, compared to 7.5% who considered that these possibilities had reduced. Delving deeper into these types of questions, it was observed that 41.6% had not felt discriminated against in the workplace due to their hearing loss, compared to 23.3% who had. After the CI, 41.2% of the patients felt less discrimination at work. A total of 67.2% of the patients in this study considered

**Figure 2** Distribution of employment status (part-time, full-time, unemployed) at the time of completing the questionnaire, one year after activating the CI. CI: cochlear implant.

**Figure 3** The results obtained in the numerical answer questions are shown descriptively (questions 13, 15-21, 23-27, 30, represented on X axis). The responses of the patients who indicated their level of satisfaction on a scale between −5 and +5 are expressed as a percentage. The response might go from a negative score (−5) passing through zero (0), which translates as indifferent or neither satisfied nor dissatisfied, to a positive score (+5) meaning satisfaction or well equipped.
that their interpersonal relationships and sociability in the workplace had improved after the implantation.

Discussion

As mentioned in the introduction, there are many studies on CI that show the relevant benefits provided by this treatment in improving the quality of life of people with hearing impairment. The positive results in language perception and production are evident. However, little information has been gathered on the benefits provided by a CI in people who are in active employment. The only article that we found, published by Kös et al., analyses whether CI help adults with hearing impairment to keep or progress in their professional lives. Sixty-seven patients were studied. At the time of implantation, 34 of them were professionally active. After the implant 29 remained in this position, 4 reported positive progress in their careers and 5 became unemployed. Those who had not been working previously remained out of work, which indicates that deafness continues to constitute an obstacle for occupational integration, since the inactive patients that looked for work did not ultimately find any. It is relevant to highlight that there were no differences in the hearing performance provided by the CI between the employed and the unemployed patients. Our study has different patient inclusion criteria, since it only includes patients who at the time of implantation were employed. Furthermore, broader aspects of quality of working life were gathered through the questionnaire than those presented by Kös et al. Nonetheless, both studies show that CI enable most implanted adults to maintain and even progress in their professional careers.

Establishing a questionnaire to evaluate the quality of working life of patients with CI helps to fill a vacuum regarding the potentially positive effects that this treatment brings to individuals and society. As mentioned earlier, this information must have significant impact on the cost benefit studies on the use of CI in the different patient groups that might benefit from this treatment. This first experience in deploying this questionnaire is deemed valid and justifies starting a formal validation process of the questionnaire before it is used systematically. To this end, it would be useful to select the most relevant questions from the questionnaire using Cronbach’s alpha, a value that enables the level of reliability of a measurement scale to be quantified, whose ideal value should be around 0–8. Likewise, a test–retest should be performed, which consists of applying the questionnaire twice after a certain amount of time to a group of patients to demonstrate that there were no differences between how they answered the first time and how they answered afterwards. Finally, once these checks have been made, the optimised questionnaire should be tested in a multi-centre, international study of Spanish speakers. All of this will help to achieve the objectives that instruments used to measure quality of life measurement questionnaires should meet. They should be people-orientated, reliable and valid, yield utility, be sensitive to change and accepted internationally.

Conclusions

CI are very useful in enhancing working life and social skills because they encourage implanted patients’ ability to communicate. Developing tools to assess the quality of working life of patients with CI is of great interest. This first experience with the Working Life Satisfaction Questionnaire for Patients with Cochlear Implants (WLSCI) has proved valuable and constitutes a first step in validating this material.

Conflict of Interests

The authors have no conflict of interests to declare.

Appendix A. Supplementary Data

Supplementary data associated with this article can be found, in the online version, at http://dx.doi.org/10.1016/j.otoeng.2017.02.004.

References

