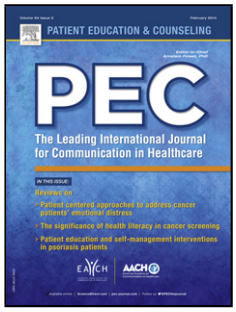

Title: Audiologist-patient communication profiles in hearing rehabilitation appointments

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Audiologist-patient communication profiles in hearing rehabilitation appointments

Running headline: Audiologist-patient communication in hearing rehabilitation

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Highlights

- Audiology consultations remain clinician-centred.
- Three-quarters of appointments began with a biopsychosocial interaction.
- All appointments ended with a biomedical interaction dominated by hearing aid talk.
- Audiologist-patient communication was not associated with decision to trial HAs.

Abstract

Objective. To profile the communication between audiologists and patients in initial appointments on a biomedical-psychosocial continuum; and explore the associations between these profiles and 1) characteristics of the appointment and 2) patients' decisions to pursue hearing aids.

Methods. Sixty-three initial hearing assessment appointments were filmed and audiologist-patient communication was coded using the Roter Interaction Analysis System. A hierarchical cluster analysis was conducted to profile audiologist-patient communication, after which regression modelling and Chi-squared analyses were conducted.

Results. Two distinct audiologist-patient communication profiles were identified during both the history taking phase (46 = biopsychosocial profile, 15 = psychosocial profile) and diagnosis and management planning phase (45 = expanded biomedical profile, 11 = narrowly biomedical profile). Shorter appointments were significantly more likely to be associated with a narrowly biomedical interaction during the diagnosis and management planning phase. No significant associations were found between audiologist-patient communication profile and patients' decisions to pursue hearing aids.

Conclusion. Initial audiology consultations appear to remain clinician-centred. Three quarters of appointments began with a biopsychosocial interaction; however, 80% ended with an expanded biomedical interaction.

Practice Implications. Findings suggest that audiologists could consider modifying their communication in initial appointments to more holistically address the needs of patients.

Keywords: clinician-patient communication; ; ; , patient-centred care, hearing rehabilitation, hearing aids

1. Introduction

Patient-centred care is **documented in policy guidelines internationally** as best-practice in health care [1-4]. Given that effective patient-clinician communication is at the heart of patient-centred care [5-10], its implementation may be challenging for clinicians who work with adults who have a hearing loss because of the impact of hearing loss on communication [11, 12]. Therefore, it is important that audiologists and other clinicians who have patients with hearing loss work around these communication difficulties to engage their patients in health care consultations, to facilitate better treatment adherence, **improved self-management**, and better patient outcomes [8, 13-15].

In the audiological context, treatment adherence, in the form of hearing aid uptake, remains low. For example, in a population-based study conducted in Australia, hearing aid uptake among adults with hearing loss over the age of 50 was reported to be 33% [16]. A number of patient-related factors (e.g., self-perceived hearing difficulties, positive attitude towards hearing aids, support from significant others to pursue hearing aid fitting) have been found to be associated with hearing aid uptake [17-19]. However, it may be that the interaction between the patient and audiologist also influences hearing aid uptake, as has been reported in qualitative research in hearing rehabilitation [20, 21], and this is the focus of the study described here.

Indeed, recent research reveals that, despite audiologists reporting a preference for patient-centred care [22], audiologist-patient interactions remain clinician-centred and continue to have a biomedical, rather than a psychosocial focus [23-25]. Grenness and colleagues [24, 25] examined the communication between audiologists and patients during initial hearing assessment appointments to ascertain to what extent audiological consultations were patient-centred. Using the Roter Interaction Analysis System (RIAS) [26], Grenness et al. [24, 25] were able to code utterances as biomedical (i.e., referring to the medical condition or therapeutic regime) or psychosocial (i.e., referring to psychosocial concerns or lifestyle information); biomedical utterances are typically more prevalent during clinician-centred interactions, whereas psychosocial utterances are typically more prevalent during patient-centred interactions. The results revealed that slightly more than half (58%) of the questions asked by audiologists during the history taking phase were biomedical in nature, and

accordingly, 51% of the information provided by patients during this phase pertained to biomedical issues such as duration of hearing loss, ear health, or history with hearing aids [25]. During the diagnosis and management planning phase wherein treatment options are typically discussed, there was a notable imbalance between biomedical and psychosocial talk [24]. More than 80% of audiologist talk devoted to education and counselling focused on biomedical topics; specifically, the types and features of hearing aids rather than discussing solutions in the context of patients' lifestyles. Patients, on the other hand, prioritised psychosocial information over biomedical information (62% vs 38%, respectively) [17].

While the aforementioned findings were novel, it is important to recognise the limitations of group statistics analysis. That is, Grenness et al. [24, 25] reported a high degree of variability in the number of biomedical and psychosocial utterances produced by audiologists and patients. For example, during the diagnosis and management planning phases of appointments, audiologists contributed 32.9 utterances pertaining to psychosocial information, but this ranged from zero utterances to 145 utterances depending on the consultation [24]. Therefore, it is likely that some of the audiology consultations were more patient-centred than others. Certainly, in other areas of health care, interactions between clinicians and their patients have been found to be on a continuum from narrowly biomedical (i.e., focus of talk on biomedical information) to psychosocial (i.e., focus of talk on psychosocial topics) and consumerist (i.e., physician answers questions of the patient) [14]. No research to date has investigated the impact of the type of audiologist-patient communication interaction on the patients' decision' to obtain hearing aids.

Accordingly, the aims of this study were to extend Grenness et al.'s [24, 25] research by: profiling the audiologist-patient communication interactions on a continuum from narrowly biomedical to psychosocial; and subsequently, exploring the associations between these interaction profiles and 1) characteristics of the appointment (e.g., clinician gender, patient gender, duration of appointment) and 2) patients' decisions to pursue a hearing aid fitting. Given that audiologist and patient talk has been found to differ according to the phase of the appointment [24, 25], we conducted separate analyses for the history taking and diagnosis and management planning phases.

2. Method

2.1 Participants and procedure

Audiologists were invited to participate in the study via professional networking events, professional contacts, and advertisements supported by the Australian professional body for audiologists. Adult patients of participating audiologists were subsequently recruited by the audiologist when their appointment was scheduled or when they attended their appointment. The final participant sample included 26 audiologists (M = 10, F = 16) and 63 adult patients (M = 36, F = 27). Demographic information about each participant group is described in Table 1 and has been described previously in related studies (e.g., [24, 25]).

Insert Table 1 here

Hearing assessment appointments were filmed with no researcher present, using the video application on an Apple iPod touch or iPhone 4 attached to a mini tripod. Information about each participant's degree of hearing loss, as well as their rehabilitation decisions, was obtained by viewing the videos. This study was conducted under the oversight of the Royal Victorian Eye and Ear Hospital Human Research Ethics Committee, The University of Queensland Behavioural and Social Sciences Ethical Review Committee, and Australian Hearing Human Research Ethics Committee. Written, informed consent was obtained by all participants.

The video data were analysed using the RIAS, a well-established system that involves the analysis of oral conversations in place of written transcripts [26]. Each utterance (i.e., smallest unit of speech that expresses a single meaning) spoken by the audiologist, adult patient, or family member was assigned one of 41 mutually exclusive codes (e.g., gives biomedical information about the therapeutic regime), each of which corresponds to a higher level category (e.g., Information Giving) [26]. A full description of these codes, including example utterances from our video data, are presented in earlier publications [24, 25]. Two raters were involved in coding the video data using the RIAS and very good to excellent inter- and intra-rater reliability was established for both raters [24, 25].

Given our research aim was to profile audiologist-patient communication on a biomedical-psychosocial continuum, we only included, in our analysis, codes that pertained to the audiologist content categories "Education and Counselling" and "Data Gathering" and patient content categories "Information Giving" and "Question Asking", wherein biomedical

talk was coded separately to psychosocial talk (see Table 2). Talk was coded as biomedical if it related to the patient's medical condition (hearing impairment) or therapeutic regime (hearing aids); or as psychosocial if it related to the patient's lifestyle or his/her psychosocial wellbeing. With one exception, codes pertaining to the affective categories (positive talk, negative talk, social talk) or the process categories (facilitation, orientation) were not included in our analyses because they did not necessarily have a biomedical or psychosocial orientation. Moreover, in this sample, the number of utterances categorised as affective was small. Emotional talk, such as reassurance ("we'll be able to do something to help with that"), was included in our analysis as it encompasses utterances that support psychosocial communication (see Table 2).

Prior to conducting statistical analyses, all utterances coded as biomedical during the history taking / diagnosis and management planning phase of a single appointment were aggregated, separately for audiologist and patient talk, as were all utterances coded as psychosocial. Thus, for each appointment, we recorded the number (and proportion) of biomedical and psychosocial utterances spoken by the audiologist and patient, during the history taking and diagnosis and management planning phases.

See Table 2

2.2 Statistical analysis

First, hierarchical cluster analyses were conducted using STATA (version 13.0) to profile audiologist-patient communication during the history taking and diagnosis and management planning phases of audiology consultations on a biomedical-psychosocial continuum. This has been done previously in primary care (see [14, 27]). Four predictor variables were included in the analyses, each expressed as a proportion of the total utterances spoken during the respective phase: audiologist-biomedical talk, audiologist-psychosocial talk, patient-biomedical talk, and patient-psychosocial talk. We anticipated that some appointments would have a greater focus on biomedical topics, and that others would have a greater focus on psychosocial topics. In order to capture this variability in the cluster analysis, we applied the complete linkage algorithm to our data [28]. This method of cluster analysis is sensitive to outliers and therefore outliers ($|z|>2.58$) were identified and omitted from the dataset prior to conducting the analyses. After conducting the cluster analyses, we computed the Calinski-Harabasz pseudo-*F* index and Duda-Hart Je(2)/Je(1) index to

determine the number of clusters present during the history taking and diagnosis and management planning phases; larger values are thought to reflect more distinct clustering [29].

Next, to describe the audiologist-patient communication profiles present within the data, we examined differences between profiles with respect to the four predictor variables: audiologist-biomedical talk, audiologist-psychosocial talk, patient-biomedical talk, and patient-psychosocial talk, expressed as a proportion of total talk (as per cluster analysis procedures) and as total number of utterances. Independent-samples *t*-tests or one-way ANOVAs were used to examine these differences, depending on the number of clusters identified. Before running these tests, outliers ($|z|>2.58$) were identified and omitted from the dataset; and normality assumption testing was conducted using Skewness-Kurtosis test for normality. Assumption testing revealed skewed data (i.e., $p < 0.05$) for the number of audiologist-biomedical utterances, number of audiologist-psychosocial utterances, number of patient-biomedical utterances, and number of patient-psychosocial utterances, recorded during the history taking phase; and for the proportion of patient-biomedical talk, proportion of patient-psychosocial talk, number of audiologist-biomedical utterances, number of audiologist-psychosocial utterances, number of patient-biomedical utterances, and number of patient-psychosocial utterances, recorded during the diagnosis and management planning phase. Accordingly, Mann-Whitney U tests were used to explore possible differences in these variables by audiologist-patient communication profile.

To determine if there were appointment characteristics that were associated with a particular audiologist-patient communication profile identified during the history taking and diagnosis and management planning phases of audiology consultations, we subsequently applied binary logistic regression modelling to the data. The primary outcome variable was audiologist-patient communication profile, and the explanatory variables included: audiologist gender, audiologist years of experience, patient age, patient gender, patient degree of hearing loss, patient eligibility for subsidised hearing aids, **audiologist-patient gender concordance,** the presence of a family member, and duration of appointment. Crude and adjusted odds ratios were computed as appropriate. The Hosmer-Lemeshow (H-L) goodness-of-fit statistic was calculated and the Receiver Operating (ROC) Curve was inspected to determine goodness-of-fit of the final fitted model.

Lastly, to determine if the audiologist-patient communication profiles identified during the history taking and/or diagnosis and management planning phases were associated with patients' decisions to pursue a hearing aid fitting at the conclusion of appointments, we conducted two separate Chi-squared tests (or Fisher's exact tests when expected cell frequencies were <5). Only patients who were recommended a hearing aid were included in this analysis (n = 49).

Statistical significance was inferred by an alpha level of 0.05.

3. Results

Cluster Analysis

History taking phase. Cluster analysis identified two audiologist-patient communication profiles during the history taking phase. The two-cluster structure had the highest Calinski-Harabasz pseudo-*F* value (33.67) and highest Duda-Hart Je(2)/Je(1) value (0.76). Forty-six appointments were characterised by a "biopsychosocial" interaction during the history taking phase and 15 appointments were characterised by a "psychosocial" interaction; two appointments were excluded due to the presence of outliers ($z > |2.58|$). The "biopsychosocial" interaction profile was characterised by relatively equal proportions of biomedical and psychosocial talk by both audiologists and patients. In comparison, the "psychosocial" interaction profile was characterised by a significantly greater proportion of audiologist-psychosocial and patient-psychosocial talk, and a significantly smaller proportion of patient-biomedical talk (see Table 3). Similar differences were evident when we looked at the total number of utterances: the "psychosocial" interaction profile was characterised by a significantly greater number of audiologist-psychosocial and patient-psychosocial utterances, and a significantly smaller number of patient-biomedical utterances than the "biopsychosocial" interaction profile (see Table 3).

When we explored associations between the audiologist-patient communication profiles identified during the history taking phase and appointment characteristics, no statistically significant differences emerged (see Table 4).

Insert Tables 3 & 4 here

Diagnosis and Management Planning Phase. Cluster analysis identified two audiologist-patient communication profiles during the diagnosis and management planning phase. The two-cluster structure had the highest Calinski-Harabasz pseudo-*F* value (26.86) and the highest Duda-Hart Je(2)/Je(1) value (0.80). Six appointments were excluded due to the presence of outliers ($z > |2.58|$) and one appointment was excluded because the diagnosis and management planning phase of the appointment was not filmed. Of the remaining appointments, 45 were characterised by an "expanded biomedical" interaction during the diagnosis and management planning phase and 11 were characterised by a "narrowly biomedical" interaction. Both audiologist-patient communication profiles included a greater proportion of audiologist talk; however, while audiologists assigned a greater proportion of talk to biomedical information, patients assigned a greater proportion of talk to psychosocial issues (see Table 5). The "narrowly biomedical" interaction profile was characterised by a significantly greater proportion of audiologist-biomedical information, and a significantly smaller proportion of patient-biomedical and patient-psychosocial talk, relative to the "expanded biomedical" interaction profile (see Table 5). Although proportions differed, the number of utterances spoken by audiologists, however, did not differ between the two interaction profiles. In contrast, the number of biomedical and psychosocial utterances spoken by patients was significantly less for the "narrowly biomedical" interaction profile (see Table 5).

When we explored associations between the audiologist-patient communication profiles exhibited during the diagnosis and management planning phase and appointment characteristics, only two statistically significant differences emerged. In univariate analyses, longer appointments (crude OR = 1.10, 95% CI = 1.03-1.19, *p* = 0.007) were significantly more likely to be associated with an "expanded biomedical" interaction profile, whereas appointments where there was audiologist-patient gender concordance were significantly less likely to be associated with an "expanded biomedical" interaction profile (crude OR = 0.11, 95% CI = 0.01-0.97, *p* = 0.047). A multivariate, binomial logistic regression model could not be fitted to the data because after two residuals were removed, all "narrowly biomedical" interactions involved gender concordant audiologist-patient dyads and therefore there was no variability on this factor. Therefore, the final model included only one explanatory variable, duration of appointment (n = 54, OR = 1.10,

95% CI = 1.03-1.19, *p* = 0.007) (see Table 4). All post-estimation testing indicated the model was a good fit (area under ROC curve = 0.85; HL statistic non-significant, *p* = 0.83).

Insert Table 5 here

Interestingly, of the 43 consultations that began with a biopsychosocial interaction, 35 ended with an expanded biomedical interaction and eight ended with a narrowly biomedical interaction. Of the 11 consultations that began with a psychosocial interaction, nine ended with an expanded biomedical interaction and two ended with a narrowly biomedical interaction (see Figure 1).

Insert Figure 1 here

Associations between audiologist-patient communication *profiles and decision to pursue a hearing aid fitting*

More than half (61%) of the participants who were recommended hearing aid/s had decided to pursue a hearing aid fitting by the completion of the appointment. When we explored the associations between the audiologist-patient communication profiles and the decision to pursue a hearing aid fitting, we did not find a statistically significant association between the decision to pursue a hearing aid fitting at the completion of the appointment and the type of interaction profile recorded during the history taking (*p* = 0.923) or diagnosis and management planning (*p* = 0.062) phases.

4. Discussion and conclusion

4.1 Discussion

The aim of our study was to describe the range of audiologist-patient communication profiles evident during the history taking and diagnosis and management planning phases of hearing assessment appointments, and subsequently explore associations between these profiles and 1) characteristics of the appointments and 2) patients' decisions to pursue a hearing aid fitting.

The history taking phase of three quarters of appointments was characterised by a biopsychosocial interaction. Essentially, as per Roter et al.'s [14] research, this type of interaction contains relatively equal contributions of biomedical and psychosocial talk from the audiologist and patient. One quarter of appointments began with a psychosocial

interaction in the history taking phase wherein a greater proportion of both audiologist talk and patient talk was focused on psychosocial topics; this was particularly evident in patient talk, where psychosocial talk was double that of biomedical talk. It is encouraging that **psychosocial talk was a focus of one quarter of the history taking phases observed in the current study, given that psychosocial talk is often not a focus of physician-patient interactions in primary health care** [14, 30-32]. However, given that adults with acquired hearing loss typically attend an audiology appointment because they are experiencing communication difficulties [17, 33] and thus may have experienced changes to their lifestyle (e.g., withdrawing from social situations) and/or general well-being [34-39], one would expect a greater proportion of audiology appointments to begin with psychosocial interaction.

In contrast to research conducted in other areas of health care [7, 40, 41], the use of a particular interaction style during the history taking phase was not associated with the audiologist's gender or years of experience. This finding suggests that it may have been the patient who drove the psychosocial exchange and the audiologist responded somewhat accordingly. Given that patients contributed twice as much psychosocial information as they did biomedical, the audiologist may have felt compelled in these consultations to ask more questions pertaining to psychosocial issues. Indeed, Street et al. [42] reported that patients were 7 times more likely than physicians to initiate active patient participation during medical consultations. Unlike in previous research, however, the patient's demographics were not associated with the type of audiologist-patient communication profile identified during the history taking phase of audiological appointments [42-44].

Although it is frequently assumed that a psychosocial exchange will take more clinical time, duration of consultation was not associated with the type of audiologist-patient interaction that occurred during the history taking phase of appointments in the present study. Other researchers have also reported no association [45, 46], whereas a systematic review of general practice consultations found that consultations wherein a psychosocial problem was identified were typically longer in duration [47]. In any case, these findings will reassure audiologists that a focus on psychosocial topics at the beginning of consultations will not necessarily prolong the length of initial assessment appointments.

Psychosocial interaction profiles were absent during the diagnosis and management planning phases of appointments. Instead, 80% of appointments were characterised by an expanded biomedical diagnosis and management planning phase, and 20% ended with a narrowly biomedical interaction. Effectively, all appointments were dominated by audiologist talk that focused predominately on hearing aid discussion, leaving psychosocial concerns largely unaddressed. This finding confirms that of Ekberg, Grenness, and Hickson [23] who used conversation analysis to explore how the audiologists involved in the present study addressed the psychosocial concerns of their patients. Ekberg et al. [23] reported that when patients raised psychosocial concerns, audiologists did not typically engage with these and redirected the conversation back to hearing aids. Collectively, this body of research suggests that audiologists are not currently taking a patient-centred approach when discussing recommendations for rehabilitation.

The diagnosis and management planning phase of shorter audiology appointments were found to be the least patient-centred. They were more likely to end with a narrowly biomedical interaction, which was characterised by a significantly greater proportion of audiologist biomedical talk relative to the expanded biomedical interaction profile, and significantly less patient input. Interestingly, despite narrowly biomedical appointments typically being shorter, the average number of utterances spoken by audiologists that focused on biomedical topics (i.e. hearing aid information) did not differ between the two interaction profiles. This result appears to indicate that audiologists were not comfortable letting go of their agenda when faced with time constraints. To facilitate a more patient-centred interaction during shorter appointments, it seems particularly important for audiologists to seek patient input early in the diagnosis and management planning phase to ensure that only appropriate rehabilitation options are discussed in the more limited time available.

There was a trend evident in the data that gender concordant audiologist-patient dyads were more likely to partake in narrowly biomedical interactions during the diagnosis and management planning phase of appointments. To our knowledge, this represents a novel finding within the hearing rehabilitation literature. Evidence for the impact of gender concordance on patient-clinician interactions in primary care settings is, however, equivocal. Where one study demonstrated that female patients within female concordant

patient-physician dyads received higher levels of patient-centred care as compared to patients in gender discordant dyads [48]; other studies have reported that the impact of gender concordance on patient-clinician interactions was less clear and often dependent on the topic of discussion (e.g., nutrition versus exercise) [49-51]. Accordingly, more research involving a larger cohort of participants is needed to truly elucidate the impact of audiologist-patient gender concordance on audiologist-patient communication during initial assessment appointments.

Despite one quarter of appointments beginning with a psychosocial interaction, our findings failed to show an association between audiologist-patient communication profiles and patients' decisions to pursue a hearing aid fitting at the conclusion of the appointment. This is likely due to the fact that psychosocial issues were not addressed in the diagnosis and management planning phase, and in the appointments that ended with a narrowly biomedical interaction, audiologists sought little patient input. Patient input and shared decision making are key elements of patient-centredness. According to Charles et al. [52], shared decision making involves an exchange of both medical and personal information and is characterised by both physician and patient input during information exchange, deliberation, and final decision. In the absence of any truly patient-centred appointments wherein psychosocial issues were considered in management planning and patients were actively engaged in decision making processes, the present study is unable to support or oppose the notion put forward by others [20, 21] that patient-centred hearing health care would result in greater hearing aid uptake. In light of the fact that only 61% of patients decided to pursue a hearing aid fitting, however, it seems that there is scope for audiologists to further embrace patient-centred care, and in doing so, we might observe changes in the uptake of hearing rehabilitation.

Interestingly, the hearing aid uptake rate of 61% reported in this study is relatively comparable to that reported by Laplante-Lévesque, Hickson, and Worrall [53] who investigated the impact of shared decision making on intervention choice. Adults with hearing loss were provided with four options, including hearing aids, a group or individual communication program, or no intervention; 54% of participants chose hearing aids and 25% chose a communication program [53]. Therefore, it is possible that a patient-centred approach to hearing rehabilitation may not promote greater hearing aid uptake, but instead

may increase the uptake of alternative intervention options which may be more suitable to patients' individual needs. It was not possible to explore this scenario in the present study as alternative interventions were offered in just five consultations; were offered only after hearing aids had been decided against; and, decisions about alternative interventions were often made outside the clinic room where the appointment was filmed.

Our results need to be considered in the context of two limitations. Firstly, we acknowledge the shortcomings associated with not collecting long-term hearing aid outcome data. For example, it is possible that some patients who indicated they wanted to pursue hearing aid fitting, may have returned or discontinued using hearing aids in the months following their hearing assessment appointment. Of course, the reverse may have also happened; some participants may have decided to pursue hearing aid fitting after having had a chance to process their hearing loss diagnosis. Secondly, by grouping talk as biomedical or psychosocial in this study we were unable to take into account how this information was exchanged. For example, we do not know if audiologists differed in their use of open versus closed questioning and the impact this may have on audiologist-patient communication and subsequently, the decision to pursue hearing aids.

4.2 Conclusion

Overall, it was encouraging that all consultations commenced with some psychosocial communication; however, biomedical topics, namely hearing aids, dominated audiologist talk during the diagnosis and management planning phase of all appointments. Thus, it seems that audiologists focused on the technological aspects of hearing aids, instead of how hearing aids could address patients' activity limitations and participation restrictions identified during the history taking phase. Therefore, unsurprisingly, the present study revealed no association between audiologist-patient communication and the decision to pursue a hearing aid fitting at the conclusion of the appointment.

If we are to promote more widespread application of patient-centred care in audiology consultations with adult patients, we need to better understand the impact of patient-centred interactions on the uptake of hearing rehabilitation (beyond hearing aid fitting) and associated outcomes. Ideally, this would require a large-scale randomised controlled trial

wherein a patient-centred practice (e.g., shared decision making) is the focus of intervention [54].

4.3 Practice Implications

Despite clinicians and patients alike acknowledging the benefits of patient-centred care in audiology, it is clear from this study that audiology consultations remain clinician-centred. This likely stems from the fact that audiology as a profession was born from a medical model and has quickly had to shift towards a rehabilitation model without congruent shifts in education and support for practicing clinicians. Therefore, we encourage all audiologists to reflect on their own practice, to consider ways in which they might be able to change their own behaviour to encourage a more patient-centred interaction with their patients, and to seek opportunities to formally learn how to implement patient-centred practice.

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Legends

Figure 1.

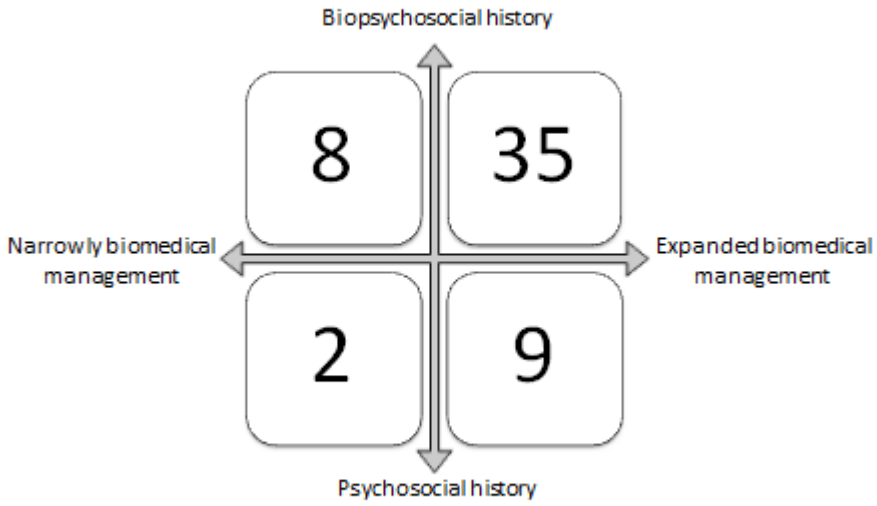

Figure 1: Number of consultations classified as beginning with a biopsychosocial or psychosocial history and ending with a narrowly biomedical or expanded biomedical diagnosis and management planning phase.

Table 1. Characteristics of participants and consultations.

	Total Sample	**ǂDecision to Obtain a HA**	
	(N = 63)	**Yes (n = 30)**	**No (n = 19)**
ǂǂAudiologist			
Gender			
Male – n (%)	10 (38%)	6 (32%)	6 (43%)
Female – n (%)	16 (62%)	13 (68%)	8 (57%)
Years of experience – M (SD)	11.4 (10.1)	10.7 (10.1)	11.8 (9.9)
Clients			
Age in years – M (SD)	71.6 (8.9)	74.2 (9.7)	69.6 (7.2)
Gender			
Male – n (%)	36 (57%)	20 (67%)	11 (58%)
Female – n (%)	27 (43%)	10 (33%)	8 (42%)
Degree of hearing loss			
Normal – n (%)	1 (2%)	0	1 (5%)
Mild – n (%)	21 (33%)	4 (13%)	4 (21%)
Mild-moderate – n (%)	28 (44%)	18 (60%)	10 (53%)
Moderate-severe – n (%)	12 (19%)	7 (23%)	4 (21%)
Severe-profound – n (%)	1 (2%)	1 (3%)	0
Eligible for subsidised hearing aids			
Yes – n (%)	30 (48%)	16 (53%)	9 (47%)
No – n (%)	33 (52%)	14 (47%)	10 (53%)
Appointment			
Audiologist-patient gender concordance	37 (59%)	14 (47%)	13 (68%)
Family member present	17 (27%)	10 (33%)	6 (32%)
Yes – n (%)	46 (73%)	20 (67%)	13 (68%)
No – n (%)			
Duration – M (SD)	57.4 (20.3)	67.2 (19.3)	55.3 (18.1)

Note: ǂ14 patients were not recommended a hearing aid; ǂǂtotal number of audiologist participants was 26. HA = hearing aid

Table 2. RIAS categories and codes for audiologists and patients that were included in the audiologist-patient communication profiles, including examples from the study.

	AUDIOLOGIST CATEGORY	CODE	EXAMPLE FROM STUDY
BIOMEDICAL	EDUCATION AND COUNSELING	**Biomedical topics** Therapeutic regimen Medical condition Counseling Other	"There are many types of hearing aids" "Hearing loss can happen gradually" "I suggest you have your wax removed by your doctor" "You'll need to talk to the researcher afterwards"
	DATA GATHERING	**Biomedical questions** Closed-ended Open-ended	"Have you ever had an ear infection?" "What can you tell me about your hearing?"
PSYCHOSOCIAL	EDUCATION AND COUNSELING	**Psychosocial topics** Lifestyle Psychosocial Counseling	"Restaurants are often noisy places" "It sounds like things have been going well in general" "You should really wear earmuffs at work"
	DATA GATHERING	**Psychosocial questions** Closed-ended Open-ended	"Do you struggle to hear your family?" "What do you find most difficult?"
	BUILDING A RELATIONSHIP	**Emotional talk** Empathy Concern Reassurance Partnership	"I imagine that must be a real strain on the family" "I'm sorry this might be uncomfortable" "We will be able to do something to help with that" "We can work on this together"

		Self-disclosure Legitimizing	"My mother went through the same ordeal" "Many people have the same trouble"

	PATIENT CATEGORY	CODE	EXAMPLE FROM STUDY
BIOMEDICAL	INFORMATION GIVING	**Biomedical topics** Therapeutic regimen Medical condition Other	"I've never had hearing aids before" "I guess I've had a hearing loss for over 10 years" "Happy to be involved as long as I don't end up on TV"
	QUESTION ASKING	**Biomedical questions** Medical Therapeutic Other	"Could the plane flight have caused my hearing loss?" "Are headphones going to do the same job as hearing aids?" "So they're filming you all day?"
PSYCHOSOCIAL	INFORMATION GIVING	**Psychosocial topics** Lifestyle Psychosocial	"I play golf on Wednesdays" "I find it difficult to hear while I'm playing golf"
	QUESTION ASKING	**Psychosocial questions** Psychosocial Lifestyle	"Do you think it's going to get worse as I get older?" "Do you think that the noise at work caused this?"
	BUILDING A RELATIONSHIP	**Emotional talk** Empathy Concern Reassurance/Shows optimism	(no example in this study) "I'm worried I'll lose my job if this keeps up" "I think I do pretty well all up" "I hear just as well as everyone else in that place"

		Legitimizing	

Adapted from Grenness et al. [24]

Table 3. Differences in audiologist and patient talk by audiologist-patient communication profile (n = 61) during the history taking phase.

TALK	**PROPORTION**					**NUMBER OF UTTERANCES**			
	Biopsychosocial appointments (n = 46)	**Psychosocial appointments (n = 15)**	***t (df)***		***p***	**Biopsychosocial appointments (n = 46)**	**Psychosocial appointments (n = 15)**	***z***	***p***
Audiologist									
Biomedical	9.6 (4.4)	8.4 (2.8)	1.01	(59)	0.32	21 (4 - 84)	19 (11 - 36)	1.60	0.11
Psychosocial	6.3 (2.3)	11.0 (1.7)	-7.31	(59)	<0.001	17.5 (1 - 58)	28 (12 - 40)	-2.78	0.01
Patient									
Biomedical	16.1 (4.6)	13.0 (6.4)	2.07	(59)	0.04	41.5 (6 - 112)	30 (3 - 67)	2.29	0.02
Psychosocial	14.7 (4.9)	28.1 (5.0)	-9.12	(59)	<0.001	39 (3 - 124)	72 (28 - 119)	-2.88	<0.01

Table 4. Descriptive statistics and crude odds ratios for characteristics of audiology appointments, by audiologist-patient communication profile, during the history taking and diagnosis and management planning phases.

	History Taking				**Diagnosis and Management Planning**			
	Biopsychosocial appointments (n = 46)	**Psychosocial appointments (n = 15)**	**Crude *OR***	***p***	**Expanded biomedical appointments (n = 45)**	**Narrowly biomedical appointments (n = 11)**	**†Crude *OR***	***p***
Audiologist								
Female gender – n (%)	32 (70%)	7 (47%)	2.61	0.12	29 (64%)	7 (64%)	0.96	0.96
Years of experience – M (SD)	9.3 (8.8)	13.9 (10.5)	0.95	0.11	10.2 (9.3)	6.1 (4.7)	1.08	0.17
Patient								
Age – M (SD)	72.1 (9.6)	70.7 (7.6)	1.02	0.59	72.4 (9.2)	68.9 (2.7)	1.05	0.27
Female gender – n (%)	22 (48%)	5 (33%)	1.83	0.33	18 (40%)	6 (55%)	0.56	0.39
Degree of hearing loss > mild in worse ear	33 (72%)	11 (73%)	0.92	0.91	33 (73%)	7 (64%)	1.57	0.53
Eligible for subsidised	23 (50%)	7 (47%)	1.14	0.82	19 (42%)	5 (46%)	0.88	0.85

hearing aids – n (%)								
Appointment								
Audiologist-patient gender concordance – n (%)	**26 (57%)**	**9 (60%)**	**0.87**	**0.81**	**24 (53%)**	**10 (91%)**	**0.11**	**0.05**
Family member present – n (%)	15 (33%)	1 (7%)	6.77	0.08	14 (31%)	3 (27%)	1.20	0.80
Duration – M (SD)	57.1 (19.8)	59.0 (22.4)	1.00	0.75	62.3 (20.2)	44.7 (17.6)	1.10	<0.01

†Only crude ORs were reported because only one explanatory variable was significantly associated with audiologist-patient communication profile. **Audiologist-patient gender concordance could not be included in the multivariate model as there was too little variability on this factor within the "narrowly biomedical appointment" group.**

Table 5. Differences in audiologist and patient talk by audiologist-patient communication profile (n = 56) during the diagnosis and management planning phase.

TALK	**PROPORTION**					**NUMBER OF UTTERANCES**			
	Expanded biomedical appointments (n = 45)	**Narrowly biomedical appointments (n = 11)**	***t (df)***	***z***	***P***	**Expanded biomedical appointments (n = 45)**	**Narrowly biomedical appointments (n = 11)**	***z***	***p***
Audiologist									
Biomedical	22.0 (3.9)	33.8 (4.3)	-8.77 (54)		<0.001	165 (21 - 630)	127 (30 - 236)	0.86	0.39
Psychosocial	10.8 (4.0)	13.5 (4.9)	-1.92 (54)		0.06	72 (7 - 318)	59 (5 - 94)	1.47	0.14
Patient									
Biomedical	4.9 (0.9 – 11.7)	3.4 (1.07 – 11.0)		2.05	0.04	37 (1 - 169)	12 (5 - 55)	3.33	<0.01
Psychosocial	7.5 (1.9 – 19.0)	4.6 (0 – 7.3)		2.63	0.01	52 (3 - 260)	19 (0 - 41)	3.54	<0.001