

## **International Survey of Audiologist's Attitude towards Telehealth**

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**Abstract**

**Purpose:** A better understanding of the attitudes of audiologists toward teleaudiology and their willingness to use teleaudiology is required to progress the application of teleaudiology technologies and services into clinical practice. Audiologists around the world were surveyed on their attitudes toward teleaudiology and their willingness to use it.

**Method:** An online survey was sent to audiologists through professional associations' mailing lists. The survey included questions on the use of computer and video-conferencing technologies, awareness and previous use of teleaudiology, and willingness to use teleaudiology.

**Results:** Responses were provided by 269 people from 28 different countries, representing a wide cross section of experience, qualification and work settings. 77.8% of respondents were female. Almost all respondents had used PC-based video-conferencing, most had used related technologies and reported positive attitudes to using these. However, less than 25% had used teleaudiology.

**Conclusions:** Despite positive attitudes towards telehealth and associated technology, the low number of audiologists who have used teleaudiology for services indicates limited clinical adoption.

## **Introduction**

Hearing loss is one of the most common disabilities in the world (WHO, 2013) and the number of audiologists is unevenly distributed across the globe (Goulios & Patuzzi, 2008). Providers and governments face challenges on how to better provide hearing health services to underserved areas and to increase efficiency in existing systems. Telehealth demonstrates potential to provide hearing health services to these underserved areas and to improve hearing health efficiency (D. Swanepoel, Clark, et al., 2010), by utilising computer and telecommunications technologies to facilitate remote consultations (Eikelboom & Swanepoel, 2016a). These consultations can be either live (synchronous) or store-and-forward (asynchronous) (Eikelboom & Swanepoel, 2016b). Screening audiometry (Lancaster, Krumm, Ribera, & Klich, 2008; D. W. Swanepoel, Myburgh, Howe, Mahomed, & Eikelboom, 2014), diagnostic audiometry (Eikelboom, Swanepoel, Motakef, & Upson, 2013; D. Swanepoel, MacLennan-Smith, & Hall, 2013), hearing aid rehabilitation (Campos & Ferrari, 2012), and cochlear implant mapping (Eikelboom, Jayakody, Swanepoel, Chang, & Atlas, 2014) have been shown to be feasible for delivery by telehealth. The audiology profession around the world plays a key role in further developing this potential. A Canadian study of audiologists and other hearing health professionals has shown that the profession believes teleaudiology will have a minimal impact on the quality of client-practitioner interactions and hearing healthcare delivery (Singh, Pichora-Fuller, Malkowski, Boretzki, & Launer, 2014). However, the attitude and readiness of this community to incorporate it as part of current service-delivery frameworks has been largely unexplored especially from an international perspective. This information will be important to take into account as teleaudiology services are implemented.

This study used an online survey to determine the telehealth experiences and attitudes of audiologists around the world, as well as their use of allied technologies such as video-conferencing systems e.g. Skype, tablet computers, email.

## **Methods**

### *Study Population and Recruitment Procedure*

Ethical clearance was obtained from the Research Ethics Committee, University of Pretoria. The study population included audiologists from around the world, recruited through professional associations. Participation was anonymous and respondents were required to

provide informed consent prior to commencing the survey. The study was conducted in mid-2013.

### *Survey Instrument*

The survey was implemented with Limesurvey (limesurvey.org), an open-source online survey application. The survey was developed to examine the following general domains: demographics, education, working arrangements, and use of technology and attitudes to telehealth. Telehealth was defined close to the start of the survey in a question about working from home in this manner: “Would you like to do more audiology work if it could be done from home, e.g. using a telehealth setup to review assessments or even evaluate patients remotely?” A subset of these data are reported here. Five questions on the use of telehealth were recorded as ‘yes’ or ‘no’. Six questions related to attitudes towards telehealth and use of allied technologies were recorded on a 5-point Likert scale from strongly disagree (scored 1) to strongly agree (scored 5).

### *Data Analysis*

Data were analysed with Microsoft Excel and IBM SPSS v20. Chi-square analysis was used to analyse categorical data in contingency tables; statistically significant independence was indicated when the significance level  $p$  was  $\leq 0.05$ . Analysis of Variance (ANOVA) was used to assess differences in continuous dependent variables related to independent continuous and categorical data; statistically significant associations were indicated when the significance level  $p$  was  $\leq 0.05$ .

## **Results**

### *Demographics of Respondents*

Surveys were received from 269 people (Table 1). Females represented 77.8% of respondents, 21.1% were male, with two not providing an answer. Males were significantly older ( $F_{1,259}=25.78, p<0.000$ ) than females; data were unavailable for nine respondents. The mean number of years working as an audiologist was 14.5, but it was significantly greater ( $F_{1,265}=21.02, p<0.000$ ) for males than for females.

**Table 1.** Demographic details of the respondents

Survey variable	Survey response	Mean (SD; range)
Age (years)	Males	48.5 (15.2; 25-88)
	Females	39.2 (11.4; 23-70)
Mean number of working years	Males	20.8 (14.3; 0.5-55)
	Females	12.8 (10.9; 0 to 55)
Survey variable	Survey response	%
Country in which respondent works	South Africa	39.8
	New Zealand	14.9
	USA	13.8
	Australia	11.9
	Canada	4.5
	Other	15.2
Current residence	City (inner or metropolitan area)	75.2
	Town or regional centre	18.1
	Small rural town	4.4
	Remote community or township	0.4
Primary qualification	Audiology	58.4
	Audiology and speech pathology	39.4
	Audiology and medicine	2.6
Qualification level	Honours	25.3
	Masters	36.4
	PhD	12.6
	AUD	10.0
	Other	15.7

The majority (74.8%) of respondents worked in one of five countries (Table 1) with the remaining responses received from people living in 23 other countries as diverse as Hong Kong, United Arab Emirates, and Venezuela.

15.5% of respondents had experience in teleaudiology. Significantly more males than females did so (Chi-sq=4.725, p=0.029). A smaller number (9.7%) had used telehealth for other medical services. Most respondents had used video-conferencing (90%) and a smartphone (81.8%) (Table 2).

**Table 2. Use of technology and attitudes toward telehealth.**

<b>Use of Technology</b>	<b>Men (%)</b>	<b>Women (%)</b>	<b>Total (%)</b>
Used PC-based, video-conferencing	96.5	88.1	90.0
Use smartphone	78.9	82.4	81.8
Use PC tablet	57.9	56.2	56.5
Used teleaudiology	24.6	12.9	15.6*
Used telehealth for other services	14.0	8.1	9.7
<b>Attitudes toward telehealth</b>	<b>Men, mean 1 to 5 score</b>	<b>Women, mean 1 to 5 score</b>	<b>Total, mean 1 to 5 score</b>
I am familiar with what the term <i>telehealth</i> entails	3.9	3.7	3.7
I am familiar with telehealth applications in audiology	3.2	3.2	3.2
If trained, I would feel comfortable to utilize telehealth for delivery of audiology services	3.9	3.7	3.7
I am comfortable with the use of a tablet computer	4.2	4.0	4.0
I am comfortable with the use of a computer	4.7	4.7	4.7
I am comfortable with the use of e-mail	4.8	4.8	4.7
I am comfortable with using PC-based video-conferencing software (e.g., Skype)	4.2	4.3	4.3

\* Significant difference  $p \leq .05$ .

Attitudes towards telehealth and willingness to use telehealth if trained were generally positive, with mean scores ranging from 3.2 for being familiar with telehealth in audiology to 4.7 for being comfortable with using a computer and email (Table 1). There was no significant association with gender or age.

## **Discussion**

This study involved a relatively large sample of audiologists from 28 developed and developing countries. The respondents were predominantly female, reflecting the nature of the audiological workforce (Laplante-Lévesque, Hickson, & Grenness, 2014). They covered a wide range of age and audiology experience, and there was an even spread of qualifications including PhDs and AUDs. They predominately lived and worked in city settings, but there was a reasonable representation of those working in regional and rural towns.

Most of the respondents indicated using computer technology including video-conferencing, and that they were comfortable using these. A positive attitude by clinicians towards teleaudiology has been reported by others (Singh et al., 2014). However, in this study, whilst most reported a familiarity with telehealth and teleaudiology, and also a willingness to use telehealth for delivery audiology services, less than one quarter reported having used telehealth for consultations.

A number of issues may contribute to this gap between the positive attitudes towards telehealth and actual use. Firstly, infrastructure and systems need to be in place for audiologists to provide telehealth services. Whilst there is a growing number of reports on the feasibility of various associated tools and technologies that can be used for teleaudiology (Eikelboom et al., 2014; Eikelboom et al., 2013), there are few publications on services that are in place. Further investigations should focus on the health and other benefits of teleaudiology for individuals, the health system, and the community to make the case for further investment in resources and infrastructure.

Secondly, the worldwide shortage of audiologists means that those in the workforce have a high caseload, without capacity to add the provision of telehealth services to their workload. This matter may be addressed by identifying underutilised personnel, or by utilising trained facilitators. The latter can be trained in tasks such as otoscopy (Biagio, Swanepoel, Adeyemo, Hall, & Vinck, 2013) and automated audiometry (Mahomed, Swanepoel, Eikelboom, & Soer, 2013), as well as facilitating synchronous tele-audiometry (D. Swanepoel, Koekemoer, & Clark, 2010).

A limitation of this study was that although responses were received from 37 countries, with South Africa, Australia and Zealand contributing 64% of the responses, the study did not reflect of the spread of audiologists across the globe.

In conclusion, this study has shown that the audiology profession has a positive attitude towards teleaudiology, and are willing to be involved in this new mode of service delivery.

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