

# Remote hearing aid fittings and maintenance – exploring applications in Africa

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## Introduction

Technology and connectivity are allowing audiological services to be provided in novel ways. The field of telehealth, although firmly established over the past two decades, is buoyed by the continued and rapid advances in information and communication technologies. Remote hearing aid services is one of the areas demonstrating significant promise. Although a number of studies and articles have documented the application of telehealth for audiological screening and diagnosis (of which many have reported equivalent results to conventional audiology methods), the clinical application of audiological intervention remains a relatively uncharted terrain. Whilst a number of audiology clinics are starting to incorporate tele-audiology assessments into their clinical services, few are venturing into the applications of remote hearing aid fittings and subsequent management [1-5].

In areas where no or very limited audiology services are available,

**“Advances in technology and the mobile connectivity revolution across Africa is opening up opportunities for audiological care in areas where there has never been access.”**

the desperation of the situation is forcing audiologists to explore these applications. The viability of remote hearing aid fittings is now seriously considered as a very real and cost-effective method for extending the reach of existing services. As a result, novel technologies for telehealth are expected to impact on the existing landscape of audiology services, especially in developing countries. Underserved populations can be reached with audiology services provided from experienced audiologists located elsewhere [7-12].

## Telehealth in audiological intervention

Audiological intervention via telehealth platforms encompasses clinical services such as the prescription, fitting and verification of hearing aids and assistive listening devices, counselling, cochlear implant mapping, vestibular rehabilitation, tinnitus management and aural rehabilitation. Peer reviewed empirical reports on hearing aid fittings and verification via tele-audiology are limited and as interest and demand for such applications grows globally, the need for further research is clear [1, 5, 6].

Remote fitting and verification of hearing aids have been demonstrated to be comparable to a control group of adults who received the same services in a face-to-face setup [7]. In an earlier study, remote verification of hearing aid fitting was also verified to be comparable to face-to-face real-ear verification procedures [8]. A multiple case study report from Australia also demonstrated that these applications can be practical and beneficial with services covering remote hearing aid fittings, including real-ear measures for verifications, hearing aid programme changes, informational counselling and hearing aid troubleshooting [9].

## African pioneering

Hearing healthcare professionals in developed countries have experienced, in most instances, only a brief glimpse of the possibilities of tele-audiological intervention when receiving remote assistance from hearing aid manufacturers. Such assistance is made possible by the use of desktop sharing software and is usually provided when audiologists encounter computer glitches or difficulties with the programming of hearing aids.

In contrast to this, clinicians in developing countries are facing the daily reality of a growing disparity between population growth and a critical shortage of hearing healthcare professionals [13-15]. In these environments, the viability of remote hearing aid fitting is being considered and evaluated with urgency as a way to reach populations currently unable to access hearing healthcare services.

The World Health Organisation (WHO) has identified sub-Saharan Africa as one of the areas with the highest prevalence of disabling hearing loss, both in adults and children. The majority of countries in Sub-Saharan Africa do not have any form of ear, nose and throat specialist and / or audiology services [13-19]. As a result, audiologists and non-government organisations (NGOs) working on the ground are becoming clinically creative in an attempt to reduce the burden of hearing loss within their countries. Sound Seekers, a British NGO which is currently working within eight African countries where audiology services are non-existent or severely lacking, has begun to consider new and innovative ways of tackling the growing burden of disabling hearing loss that is facing the continent. They have recently taken a step towards extending the

reach of their humanitarian audiology services by implementing the first tele-audiology assessment and intervention services in Zambia, with promising outcomes being reported. In June 2014, the team attempted their first remote hearing aid fitting. The equipment that was used involved two mobile phones, two laptops, a WiFi modem with 3G internet connectivity, a portable webcam, a NOAH Link hearing aid programmer and a set of donated behind-the-ear hearing aids coupled to full shell silicone ear moulds (manufactured by the clinical officer at the remote site). By using a combination of WhatsApp, Team Viewer (for audio and video interaction, as well as desktop sharing), an audiologist in Cape Town was able to assist two audiology officers located 3300km away at Ndola Central Hospital with the selection and fitting of binaural hearing aids for a 13-year-old female patient with a severe sensorineural hearing loss. The session was supervised at the remote site by Zambia's sole audiologist, who was able to evaluate the session and provide necessary feedback to the audiologist in South Africa.

The remote programming of the hearing aids was successful and the patient was able to hear a significant difference once the hearing aids were switched on. However, difficulties were encountered due to the lack of verification equipment and the need for further training of the staff located at the remote site. This experience has been instrumental in guiding Sound Seekers regarding their future service delivery model for tele-audiology in Zambia and potentially other project sites. In order to maintain international best practice standards, future attempts will include improved training and education of patient facilitators at the remote site and the application of remote hearing aid verification procedures. The team is also considering the possibility of using hearing aids coupled to slim tubes and standard domes for 'instant fittings' where appropriate, which will reduce the number of appointments for the patient after his/her initial assessment appointment.

**Further research and applications**

Advances in technology and the mobile connectivity revolution across Africa are opening up opportunities for



Clinical officers in Ndola, Zambia prepare 13-year-old patient for remote hearing aid fitting by audiologist located in Cape Town, South Africa.



Portable webcam used by clinical officer in Zambia to provide visuals of ear mould and placement of hearing aid to remote audiologist in South Africa.

audiological care in areas where there has never been access. The combination of empirical studies on tele-audiological intervention and anecdotal evidence from clinicians who are piloting remote hearing aid services within their daily clinical practice is offering hearing healthcare professionals a glimpse into the real-life possibilities that such technology can offer. In addition, it highlights the practical challenges of employing techniques that are still relatively unconventional. The need

for extensive research on audiological practice in this area is clearly evident, particularly within the context of suggested clinical protocols and service delivery models. The application of hearing aid fitting and verification is not an insular task and extends into other spheres of telehealth, most importantly the area of tele-intervention and tele-mentoring. The potential is clear but more research and development is urgently needed to ensure valid and accountable service-delivery models.

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