"USER'S SATISFACTION BY PROCURING HEARING AIDS USING HEARINGAIDKART, A DEDICATED AND ETHICAL E- COMMERCE TOOL: A CASE STUDY"

Research Paper

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Abstract

The Internet has created both opportunities and threats that providers of all stripes must eventually confront to remain viable businesses in the new economy. Although business-to-business (B2B) innovations offer great hope in reducing costs and providing other efficiencies, electronically connecting with patients is a particularly challenging frontier where technical hurdles are generally exceeded by political, legal, workflow, and other barriers. This study introduces a proposition for the foundation of a business that will encourage the offer of dedicated e-commerce site (www.hearingaidkart.com) in India. A case with moderately severe Sensorineural Hearing loss procured binaural digital programmable hearing aids. Patient had received hearing aid trial by a qualified audiologist within 3 days of procurement and further verified at nearest centre approved by the kart within one week. International outcome inventory of hearing aids (IOI-HA) was used after hearing aid trial at home and verification process at clinic and found significant satisfaction quantitatively at p=0.05.

Key Words: E-commerce, Hearing Aid Kart, IOI-HA

Introduction

E-commerce appears to be ready to help the healthcare business reengineer itself. The use of electronic information technologies to perform business transactions between buyers, sellers, and other trade partners is referred to as e-commerce. WHO defines eHealth as the cost-effective and secure use of information and communications technology in support of health and health-related disciplines, such as health-care services, health surveillance, health literature, health education, knowledge, and research (WHO, 2005).

There are variety of e-Health services are available among them- Electronic health record, Computerized physician order entry, e-Prescribing , Clinical decision support system, Telemedicine, Telerehabilitation, Tele-surgery, Tele-dentistry, Consumer health informatics, Health knowledge

management , mHealth or m-Health, Health informatics / healthcare information systems (Wikipedia, 2021).

The number and range of eHealth services available to adults and seniors who use hearing aids is rapidly increasing. This field has the potential to reduce costs, enhance access to care, and improve patient outcomes and satisfaction. Despite the growing interest in this sector, there is a paucity of current information on new research in the field of eHealth for individuals who wear hearing aids (Paglialonga, 2018, p.2).

Consumers have recently demanded Over-the-Counter (OTC) hearing aids, which some people are selling on various e-commerce sites, but the difficulty is that they require a distinct examination and trial methodology before being prescribed.

Hearing aids aren't only a way to make sounds louder, according to the American Speech Language and Hearing Association (ASHA, 2021). It's a sophisticated medical instrument. It's critical to understand why someone is experiencing difficulty hearing. Knowing this will assist them in determining which sort of hearing aid will be most beneficial to them. Hearing aids should be customised to a person's specific hearing needs. Not everyone can use the same hearing aids, and the benefits may vary in terms of ease of listening, accessibility, troubleshooting, and other tailored, need-based applications.

It has been discovered that hearing health e-commerce study focuses solely on over-the-counter hearing aids, with consumers occasionally purchasing hearing aides prior to any hearing aid trial or examination, potentially affecting persons' residual hearing. It's also been noted that OTC hearing aids are only accessible for mild to moderate hearing deficits, thus not all types of hearing loss can be helped.

Hearing aids purchased without a thorough hearing test and additional services may not match the needs of the user (ASHA 2021). She or he may end up purchasing hearing aids that are ineffective. It necessitates a number of evaluation and trial processes. It requires post-sale support and periodic reprogramming depending on a recent hearing evaluation. Unfortunately, there are no ethical e-

commerce sites for qualified Audiologists to ethically operate online hearing aid dispensing (Hearing health care professionals, involved in scientific and clinical verification of hearing aid fitting).

Background

It has been discovered that e-Health services are fast expanding, even among hearing aid users, due to their cost-effectiveness, improved access to care, and improved patient outcomes and satisfaction among the adult and older population. As a result, the hearing health business continues to use a variety of ways to provide online services to people with hearing loss, such as data gathering, teleconsultation, remote monitoring, remote fitting, and the transmission of educational programmes to people with hearing loss. Since 1994, Cherry and Rubinstein have advocated for the use of eHealth for patient follow-up in the field of audiology. Following face-to-face hearing aid fittings, they began telephone follow-up (Cherry R, Rubinstein A,1994, p-57). Since then, the use of eHealth has risen, and multiple solutions for various hearing-related diseases are now available (Paglialonga, 2018, p-2). Hearing screening examinations using the telephone have been tested in about ten countries, including the Netherlands, the United Kingdom, and Australia (Smits, Kapteyn, and Houtgast 2004; Smits, Merkus, and Houtgast 2006; Stenfelt et al. 2011; Dillon et al. 2016).

Meijerink JFJ, et al. (2017, P-1) developed an educational "SUpport PRogramme" named "SUPR" that develops an aftercare programme for hearing aid users. The findings demonstrate that older hearing aid users can benefit from SUPR and are willing to use it to improve their hearing health.

Recently WHO has released a mobile and web-based software programme for hearing screening, which was developed with the help of an advisory panel that included Dr Jackie Clark, Dr Deborah Ferrari, Dr Cas Smits, and Dr De Wet Swanepoel (WHO, 2018).

In addition to these forms of e-commerce, one of the most important forms of e-commerce in the hearing health industry is over-the-counter (OTC) hearing aids, which are fitted by the user (self-fitting) without the involvement of a hearing care professional and are based on automatic-selection of signal processing parameters with or without an automated evaluation of hearing status.

The US Food and Drug Administration (FDA) announced in December 2016 that it would no longer enforce the requirement that people get a medical examination or sign a waiver before purchasing hearing aids. The agency also stated that it will investigate developing a category of over-the-counter hearing aids, including by recommending regulatory changes to allow for more access to innovative, lower-cost solutions. After Congress approved the Over-the-Counter Hearing Aid Act in 2017, which aimed to encourage inexpensive, accessible hearing health care, the OTC hearing aid market exploded. The law's supporters believe it will lessen the harmful impacts of untreated hearing loss by promoting hearing aid adoption among those who are disadvantaged by standard service delivery models (Urbanski D et al, 2020, P -1).

The self-fit technologies used in OTC hearing aids allow the user to choose from a small number of pre-programmed or preset settings. A full set of wide dynamic range compression (WDRC) parameters is available in the pre-programmed or preset mode, where the user can choose a preset and change an overall volume control that is broad band gain. Depending on how well the presets are matched to the user population, this strategy can be more or less successful (Andrew T. Sabin et al, 2019, p-2). One recent clinical trial done by Humes et al. (2017, p-53) to determine efficacy of hearing aids in older adults using audiology best practices (AB), to evaluate the efficacy of an alternative over-the-counter (OTC) intervention of consumer decide OTC hearing aid (CD), and to examine the influence of purchase price on outcomes for both service-delivery models. 163 participants were selected with ages 55-79 years, received the same high-end digital mini behind the ear hearing aids fitted bilaterally for one month trial period. AB groups received best-practice services from audiologists and CD participants self-selected their own pre-programmed hearing aids via an OTC model. The result shown AB service-delivery model was found to be efficacious for most of the outcome measures. In contrast, Leavitt et al (2018, p-10) Six case studies replicating the Humes et al study methods are presented here, with the results showing that people with moderate hearing loss (41-55 dB PTA) may be better served by what Humes et al characterized as an “audiology best practices” model. Leavitt et al also mentioned that it would appear that the use of a consumer-driven care model for people with moderate hearing loss requires further research and careful consideration before implementation.

We know that over-the-counter hearing aids are only for mild to moderate hearing loss based on all of the preceding studies. Furthermore, it is a pre-programmed self-fitting hearing aid that eliminates the need for an audiologist, saves time, and allows consumers to purchase hearing aids online with a range of alternatives. However, for the majority of outcome measures, OTC or direct to consumer hearing aids or wearable self-fitting hearing aids are proven to be less effective than audiologist best practises service delivery model. OTC hearing aids are ineffective for people with severe to profound hearing loss. Hearing professionals' support programmes for hearing impaired people, such as 'SUPR,' have also been found to be more fruitful, even when consumers utilise self-fitting hearing aids, because hearing professionals guide and inform them.

As a result, it is obvious that simply pre-programmed or self-fitting OTC e-commerce hearing aids are insufficient to provide significant results for those with hearing loss. This hearing health e-commerce requires further attention and support.

Before dispensing hearing aids via the internet, it is vital to develop an ethically based hearing health care support (HHCS) system e-commerce site. We must validate the audiometry report before distributing a hearing aid, and we must re-audiometry in a home-based environment if the client is unable to come to the nearest clinic for trial and fits. The acoustic properties of the room(s) shall be determined with a sound level metre and reported on the audiogram if evaluations are undertaken outside of a commercially available sound treatment booth. For auditing purposes, the sound level meter's serial number must also be recorded on the audiogram. When headphones are used, the ambient noise level must not exceed 40dBA, and if insert phones are used, the ambient noise level must not exceed 48dBA (Alberta Health, 2021, P-12-20).

Hearing aid programming, fitting, and other services were frequently challenging during the Covid 19 outbreak. As a result, the majority of geriatric clients are looking for alternate online services for troubleshooting and other critical hearing aid needs. Despite the huge demand for online services, no specialised ethical online hearing aid dispensing and post-care services (HHCS) are currently offered in India. As part of the DBA thesis and patient services, a dedicated online hearing aid e-commerce

(www.hearingaidkart.com) was built. A detailed process for developing a hearing aid e-commerce solution has been provided.

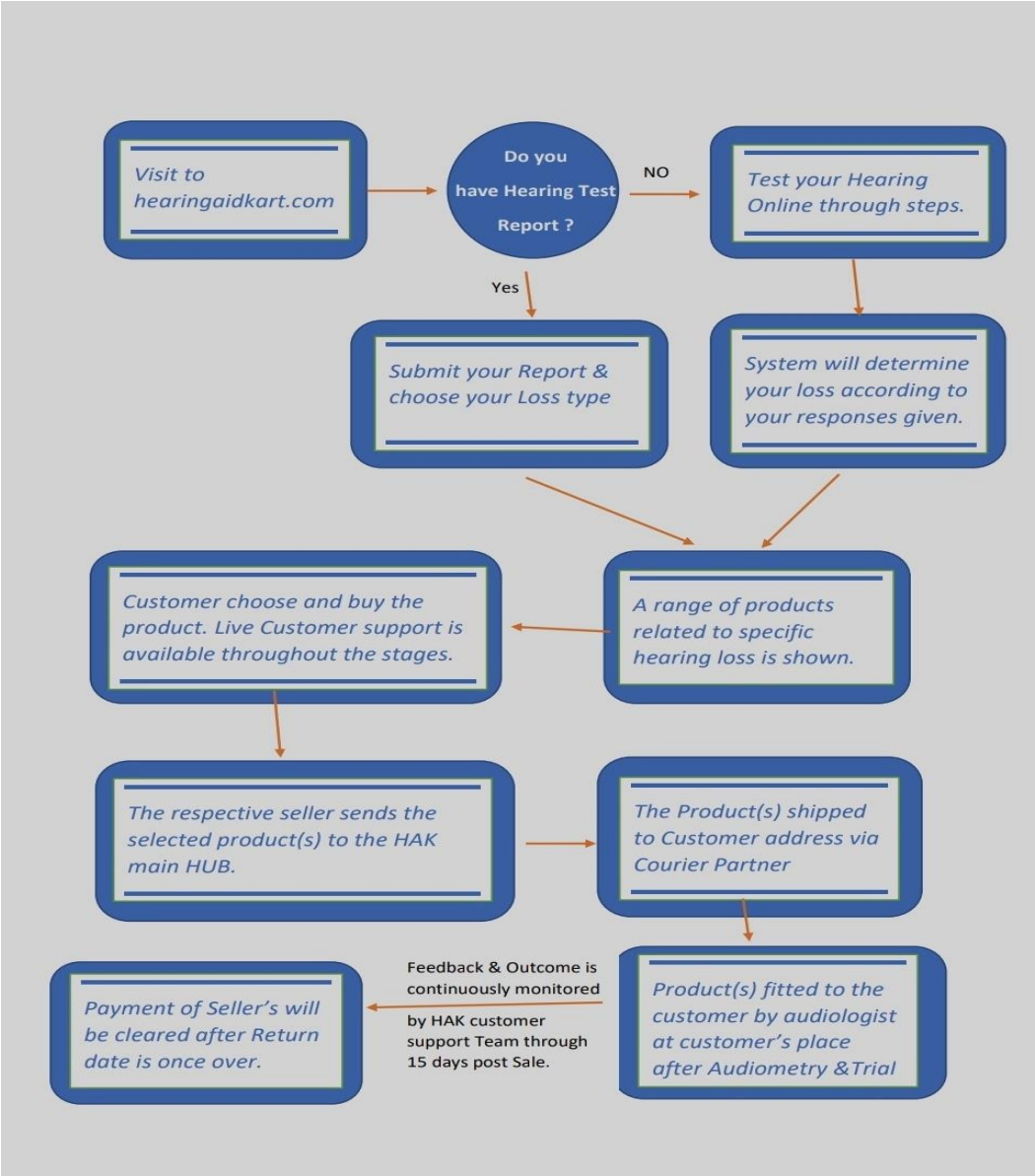

Table 1. Flowchart of Hearing Aid Kart.

Case Study

Demographic details of a case

72 years old retired Army personnel with post-graduation in English and residing in the suburban area of Kolkata, India. He has wife, son and daughter, are staying in USA.

Clinical records

Patient had bilateral moderately severe to severe sloping sensorineural hearing loss since last 5 years and dissatisfied with hearing aids received 5 years back. He had uploaded previous records including Audiogram, Aided testing reports and aided and unaided speech perception reports along with ENT reports where advice had given for hearing aid trial and fitting.

E-Commerce based procurement

He had visited www.hearingaidkart.com and choose three options of hearing aids and paid the lowest amount amongst the three as instructed in the dedicated kart and call centre executive fixed an appointment for home based hearing aid trial and fitting by the qualified audiologist. Within three days after procurement Audiologist visited with hearing aids chosen by the patient and take earmold impression. Informal hearing aid trial has been done on same day by using Receiver in the canal (RIC) as well as conventional ear tip. Both the conditions were recorded and outcome was recorded before trial (as he has been already used hearing aids), after the trial with RIC and also after the trial with ear tip provided by the manufacturers using mobile video camera and International outcome inventory of hearing aids (IOI-HA) questionnaire.

(IOI-HA, Cox & Alexander, 2002). IOI-HA is the assessment more commonly used internationally to measure hearing aid outcomes. IOI-HA has been translated to over 30 languages across the globe. IOI-HA is a seven-item questionnaire developed for use in both research and clinical settings to subjectively evaluate hearing aid outcomes. The questions focus on: (1) time during which hearing aids have been used; (2) benefit; (3) residual limitation in daily life activities; (4) satisfaction; (5) residual restrictions to participation; (6) impact on other people; and (7) quality of life. Each of the items has a five-point response scale, and it is possible to calculate a total score for the measure, with higher scores reflective of more positive outcomes. The response to each question ranges from “poor performance” (score ¼ 1) to “best performance” (score ¼ 5). The IOI-HA is brief enough to be appended to a research protocol without significant cost in time or other resources.

After 7 days he was called again for clinical verifications of hearing aids in three conditions formally with reference to 7+3= 10 day's usage of RIC aids and after fitted with conventional earmold based fitting.

Price discrepancies

As he has paid lowest price previously and opted for high end products for both the ears, so extra amount was paid offline at the clinic and 2 years warranty protocol was generated. Catch trials were subjected to correlation measures using chronbach alpha at p=0.05

IOI-HA - Results Obtained

TRIAL NOS.	INFORMAL TRIAL AT HOME
1.BEFORE FITTING	11 – CATCH TRIAL 1
2. AFTER FITTING WITH AIDS 1 USING RIC	24
3. AFTER FITTING WITH AIDS 2 USING RIC	26
4. AFTER FITTING WITH AIDS 3 USING RIC	28
5. AFTER FITTING WITH AIDS 1 USING TIP	14
6. AFTER FITTING WITH AIDS 2 USING TIP	15
7. AFTER FITTING WITH AIDS 3 USING TIP	14

Table 2. IOI-HA scores in home fitting.

TRIAL NOS.	INFORMAL TRIAL AT HOME
1.10 DAYS USAGE OF RIC HEARING AIDS 1 FITTED AT HOME(RE-VERIFICATION)	26-CATCH TRIAL 2
2. AFTER FITTING WITH AIDS 2 USING RIC (RE-VERIFICATION)	24
3. AFTER FITTING WITH AIDS 3 USING RIC(RE-VERIFICATION)	22
4. AFTER FITTING WITH AIDS 1 USING EARMOULDS	18

5. AFTER FITTING WITH AIDS 2 USING EARMOULDS	16
6. AFTER FITTING WITH AIDS 3 USING EARMOULDS	18
7. 1 MONTHAFTER FITTING WITH CHOSEN HEARING AIDS (Telephonic feedback)	28- CATCH TRIAL 3

Table 3. IOI-HA scores in clinical fitting.

Catch trials were subjected to statistical analysis using SPSS VERSION 16.0. Based on tables 1 and 2, it were found that 3 catch trials with reference to 3 conditions in 2 different settings were highly correlated – catch trial 1 with 2 = 0.76 (p= 0.123> 0.05), catch trial 2 and catch trial 3 = 0.82 (p=0.342>0.05) and catch trial 3 and catch trial 1 = 0.77 (p=0.239>0.05).

Patient feedback (descriptive)

Patient was highly satisfied with reference to services offered in hybrid mode (online + offline) and virtual monitoring /trouble shooting in 100 points visual Analog scale where 1= not satisfied and 100= extremely satisfied. Patient was given rating of 75, means high satisfaction.

Discussion

From the IOI-HA ratings, statistical correlational analyses vividly revealed the efficacy of e-commerce as well as ethical hearing aid dispensing. There is a compelling need for hybrid e-commerce services to address the need for cutting-edge pedagogies among an older population. Untreated hearing loss has negative implications on a micro level, hurting one's family and communication partners, as well as on a macro level, harming society as a whole. With the unequal distribution of resources and services being a challenge to Hearing aid e-commerce, combining virtual and face-to-face services in a hybrid offering could be a viable alternative service delivery model. Making people aware of the need of having their hearing tested and knowing their hearing status could be a first step toward improving knowledge about e commerce in the twenty-first century. In this example, the elderly patient has been more possessive not just as a result of online purchase, home visits, and virtual monitoring, but also as a result of the clinical impact of the verification processes. According to research, advancements in innovative technology and better access to worldwide connectivity are potential that could change present hearing health care service delivery systems in order to maximise access, efficiency, and effect

(Clark and Swanepoel, 2014, P-210). Previous tele-audiology studies have looked into patient satisfaction with remote hearing aid fittings, services, programming, and fittings, and have found that patients are generally satisfied. However, rather using a process evaluation of patient experiences and happiness with Hearing aid usage, the studies reported outcomes based on standardised hearing aid outcome measures (International Outcome Inventory for Hearing Aids and Satisfaction with Amplification in Daily Living).

Conclusions

The use of e-commerce and a hybrid form of fitting may increase awareness of hearing loss prevention and promotion, as well as the effectiveness of e-commerce services. Integration of this proposed hybrid model into existing audiology practises could lead to new audiology patient pathways through online hearing screening, assessing readiness to seek additional dedicated e-commerce services using synchronous and asynchronous methods, and the enhancement of service delivery models defining greater Tele-Audiology efficacy as technological advancements and accessibility increase in the coming years. This study will be repeated in the future with a larger number of participants in order to assess the benefits of hearing aid dispensing via dedicated e-commerce with hybrid functional pedagogies.

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