The Future of Private Practice in Audiology

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ABSTRACT

Although private practice in audiology has evolved during the past 40 years, hearing aids have remained as a central component to success. This article will discuss present and future trends for the next 40 years, including parallels to other professions and the need to innovate beyond technology.

KEYWORDS: Hearing loss, hearing aids, audiology, personal sound amplification products, President's Council of Advisors on Science and Technology, Food and Drug Administration

Learning Outcomes: As a result of this activity, the participant will be able to (1) describe three differences between the professions of audiology, optometry, and dentistry as they relate to private practice trends; (2) list the primary recommendations made by the National Institute on Deafness and Other Communication Disorders Working Group (2009), as they relate to persons with hearing loss; (3) list five ways that technology will impact the diagnosis, treatment, and rehabilitation of hearing loss in the future.

When I graduated with a master's degree in audiology in 1983, one of my professors pulled me aside, wished me well, and said that he was glad that he was in his shoes, rather than mine, as he was concerned for the future of the profession. Nearly 35 years later, I can state unequivocally that I have not regretted one moment of my decision to become an audiologist, and although there are challenges ahead, I also see tremendous opportunity. In contrast to that professor, I only wish that I had the opportunity to start over, as I feel the future for the profession and private practice is bright, as long as we are willing to adapt. To that end, the focus of this article will be to discuss the current status and make some predictions for the future.

CURRENT STATUS

Comparison to Other Professions

Audiology has steadily increased in visibility during the past decade, and it has consistently ranked highly on best-careers lists during the past 5 years.[1–3] This is no doubt due to the transition from the master's degree to the doctorate of audiology, as well as the emergence of the baby boomer generation as the primary patient demographic for hearing and balance disorders. Comparison to other professions, including dentistry and optometry, reveals similar trends, particularly as they adapt to meet the needs of the 78 million boomers. There is more, however, behind that story that

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Private Practice; Guest Editor, Gyl Kasewurm, Au.D.

Semin Hear 2016;37:369–378.
DOI: http://dx.doi.org/10.1055/s-0036-1593994.
ISSN 0734-0451.

provides insight for the future of audiology private practice.

OPTOMETRY

In 1980, there were ~22,000 optometrists practicing in the United States; almost 90% were either owners or partners in a private practice.[4] Over the course of 30 years, however, industry consolidation occurred, as the number of vision care product manufacturers was reduced to only a handful of large players that increased market share (and profit margins) through their own retail networks. The impact of the baby boomer generation was significant, as many individuals with no history of visual impairment began experiencing "front of the eyeball" issues requiring correction for refractive eye disorders. The combination of technological improvements, corporate consolidation, and changes in distribution has resulted in a transformation of optometry from employers to employees for more than half of the 35,000 optometrists practicing in the United States,[5] as most optometrists are now working either part-time or full-time for retail corporations. It will be interesting to see if this trend continues as optometry prepares for the second wave of their baby boomer experience, as the majority of that generation begin to move from "front of the eyeball" (refractive) to "back of the eyeball" (e.g., glaucoma, macular degeneration, retinal detachment) issues.

DENTISTRY

There are currently nearly 200,000 practicing dentists in the United States.[6,7] Unlike optometry, however, to date, dentistry has remained predominantly an autonomous profession, with fewer than 17% of all active practitioners working as employees.[8] There is a trend toward corporate dental practice,[9] but many private practitioners are increasingly focusing on specialty and preventative care as a means of differentiating from their competition. Another focus of potential interest to audiology has been the growth of mid-level dental providers, including hygienists, and a focus on balancing third-party and private pay reimbursement.

Table 1 suggests that corporate consolidation is already underway for audiology; from 2005 to 2013, the self-described primary job title clinical staff audiologist grew from 54 to 59%, while the collective job titles of director, owner/partner, or CEO declined by roughly 6%.[10] During the same time period, salaries for clinical audiologists rose 21%, while compensation for those working in independent practice increased by 41%. What does the future hold, and what may be learned from the parallels to optometry and dentistry?

Urgency for Action

One thing that both dentistry and optometry have accomplished is the need for regular office visits and a sense of urgency when a problem exists. According to the Glaucoma Research Foundation,[11] 74% of adults surveyed said that they had their eyes examined at least once every 2 years. The U.S. Department of Health and Human Services Centers for Disease Control and Prevention reports that over 63% of adults in the United States visit their dentist annually.[12] In comparison, Abrams and Kihm report that only 23% of adults had their hearing

Table 1 Self-described Job Title for Employed Audiologists

	% of Work Force					
Primary Job Title	2013	2011	2008	2007	2006	2005
Clinical staff audiologist	59	61.9	58	55	52	54
Researcher	2	1.9	1	1	2	1
Faculty	7	3.7	5	5	7	6
Manager/supervisor	8	7.8	9	10	9	10
Director	6	7.1	6	7	8	8
Owner/partner	10	12.3	14	14	14	13
CEO/executive director	<1	<1	1	1	1	1

Note: From American Academy of Audiology Member Surveys.[10]

screened during their last physical.[13] This included those who were simply asked, "How's your hearing?" This is despite the fact that the Centers for Medicare and Medicaid Services added a new benefit (over a decade ago!) for Medicare Part B beneficiaries that provides for hearing and balance screening questionnaires to be administered by a physician or qualified nonphysician provider during the Welcome to Medicare examination.[14] It is only available for the first 6 months after enrollment, and limited to questionnaires only, but it is a start toward raising awareness for the importance of hearing, and reflects an age-related prejudice toward hearing loss in the United States. To wit: in 2013, Centers for Disease Control and Prevention data showed that over 97% of newborns in the United States were screened for hearing loss,[15] and yet less than a quarter of older adults had their hearing screened, even though half of those aged 70 and older have measurable hearing loss![16]

The mounting evidence linking comorbidities of untreated hearing loss with cardiovascular disease and cognitive decline,[17,18] as well as many other health conditions, may assist audiologists with establishing urgency for action. Additional research is necessary, however, to establish causation, as well as correlation, particularly for hearing loss and incident dementia, which in turn may increase market penetration of hearing aids beyond 30% of those with measureable hearing loss.[13]

FUTURE TRENDS

Improved Accessibility and Affordability

In response to persistently low market penetration during the past 30 years, the Food and Drug Administration (FDA) issued a guidance document for industry and FDA staff related to hearing aid devices and personal sound amplification products (PSAPs) in February 2009.[19] Subsequently, the National Institute on Deafness and Other Communication Disorders (NIDCD) established the Working Group on Accessible and Affordable Hearing Health Care for Adults With Mild to Moderate Hearing Loss in August, 2009.[20] The goal of both of these initiatives was to increase hearing aid access and affordability for persons with mild to moderate degrees of hearing loss. The original guidance created the PSAP category for those individuals who did *not* have measureable hearing loss, but nonetheless had difficulty with distant or soft speech. Finally, the FDA issued draft guidance for regulatory requirements for PSAPs in 2013,[21] which further clarified that PSAPs were designated for "non-hearing-impaired consumers."

This federal activity led to considerable discussion and debate in the scientific community, leading to the President's Council of Advisors on Science and Technology (PCAST) to hold a series of meetings in 2015, culminating in a document that recommended that the FDA open the hearing aid market by withdrawing the 2013 FDA draft guidance and establish a new class of over the counter (OTC) hearing aids for mild to moderate age-related hearing loss that could be purchased without the need for a credentialed dispenser (i.e., audiologist or hearing instrument specialist).[21,22] In addition, two more recommendations were made largely to provide portability of the hearing loss diagnostic testing results and suggested fitting results.

Finally, the Institute of Medicine (IOM), which eventually became known as the National Academies of Science, Engineering, and Medicine (NASEM), provided a series of consensus meetings and a report with 12 recommendations to improve access and affordability in June 2016.[23] The report acknowledged that FDA regulation has not stifled innovation and hearing aid advancement, and also recommended regulation of OTC products, with distinction from regulations applied to hearing aids and PSAPs.

The "good news, bad news" of all of this activity is that it has raised awareness for the importance of hearing; at issue is how private practitioners withstand the harsh glare of the perception that hearing aids are too expensive, due in large part to the bundled model of technology and service that dominates the U. S. market. At issue is whether the creation of a separate category of OTC devices for persons with mild to moderate hearing loss would improve access and affordability without potentially harming the patient or compromising care. At the moment of this writing, no decision

has been made by the FDA regarding expanding PSAPs or creating a new class of OTC devices.

The consumer electronics industry has introduced a flurry of products from Samsung, Apple, and smaller companies like Bragi that provide impressive technology for wireless connectivity, audio transparency, and even beamforming microphone arrays previously found only on premium hearing instruments. If approved for use with mild to moderate hearing loss, without the need for a professional, it could dramatically impact the way hearing aids are distributed in the United States. Private practitioners will need to demonstrate their added value to this process in the face of unbundling of the device price from their professional services. To do this, they will need to demonstrate innovations beyond technology.

Innovations beyond Technology

Topics that have been addressed elsewhere in this issue, including the use of assistants and support personnel, key performance indicators to drive business, best (evidence-based) practice, and proper billing/coding techniques will all assist in improved delivery of hearing and balance services. The inexorable regulatory and technology changes that will impact the hearing aid industry, however, have the potential to alter the distribution process that has been in place for decades.

Clayton Christensen coined the term *disruptive innovation* as one that creates new market and distribution channels, eventually displacing existing market leading firms, products, and services.[24] Disruptive innovations tend to be produced by outsiders and entrepreneurs, rather than from existing market leaders, because the products and services are initially seen as inferior or not profitable enough (at least at first). It is, however, possible for an industry or profession to self-disrupt if they are open to drastic change from the *status quo*.

The Inevitable

In his recent book, Kevin Kelly also addresses the rapid pace of innovation, in terms of a dozen technological forces that will shape the future of any discipline, due to digital technology.[25] I have framed the predictions for the future of audiology private practice around Kelly's 12 forces of technology.[25]

BECOMING

According to MarkeTrak 9,[13] the average replacement cycle for hearing aids has increased to between 6 to 7 years, presumably due to cost and increased reliability. During the life span of the typical analog hearing aid, this meant that the primary emphasis was placed on maintenance to ensure that components were kept in proper working order and that changes in hearing loss were accounted for by the audiologist. The advent of first digitally programmable analog, and eventually, digital hearing aids in the early 1990s provided dramatic improvements in device flexibility to adjust hearing gain and output to meet patient changing needs. Today's devices, however, offer the opportunity for continual upgrades to feature sets including compression, noise management, feedback cancellation, and other sophisticated features as new algorithms become available. Patients from the traditionalist generation (born pre–World War II) may be less than enthusiastic about paying more for software or firmware upgrades to a device that they have already purchased, but it has become commonplace for baby boomers to pay for upgrades to software, apps, and other programs whose features change over time. Tomorrow's hearing aids will not necessarily last any longer, but upgradability will enable them to remain state-of-the-art over their life span. That said, not all patients will be comfortable with the continuous process of upgrades without guidance and support of their clinician. In a sense, the continuous evolution of the products due to products *becoming* better will provide a consistent role for the audiologist to help the patient overcome the feeling that they are a perpetual newbie. The momentum of technology, particularly as it appeals to the new generation of baby boomers who will soon become the dominant force in the hearing aid market, will provide the motivated professional with a way to prevent

commoditization by serving as an interface between the hearing aid and the patient.

COGNIFYING

Artificial intelligence (AI) is ubiquitous these days; even a miniscule amount of useful intelligence embedded into an existing device promises increased effectiveness and efficiency. Or so we thought, over 20 years ago when hearing aids first incorporated data logging of wearing time, listening environment, and battery life. Hearing aids have used some form of AI without much fanfare for quite some time, and the more recent integration of "made for iPhone" and "made for Android" hearing aids have *cognified* them further. Using the smartphone's integrated geotagging capability and motion sensors permit hearing aids to know where the user is, whether they are moving or standing still, and whether they have been in that place before. Hearing aids already have moved well beyond the era of a stand-alone device that provides gain as a function of frequency, and the hearing aids of tomorrow will provide both the user and practitioner with a wealth of "always on" intelligence. Microelectromechanical sensors will provide information regarding whether the hearing aids are inserted in the proper ears, whether they have been exposed to high humidity, and even report biomedical information, such as heart rate, temperature, and blood sugar levels. They will be capable of providing appointment reminders (when to come in for appointments, recharge batteries, dehumidify), real-time translation, and health reminders (when to take medication, if they are at risk for a fall, or even if they are having a heart attack). Cognifying the world is a big deal, it is happening right now, and the ear will serve as an important interface. This transition will be overwhelming for many patients, and the role of the practitioner will be to assist with the interpretation of big data into bite-sized portions. The audiologist is uniquely qualified to serve in the capacity of counselor, coach, technical advisor, health practitioner, and data analyst.

FLOWING

The *Internet of things* is a proposed development of the Internet in which everyday objects have network connectivity, allowing them to send and receive data seamlessly in real time. With regard to hearing aids, the most promising strategy relates to wireless connectivity. Imagine a hearing aid user walking into a theater, lecture hall, or movie and automatically being asked whether they want to pair with the sound system. Many televisions are already equipped with Bluetooth connectivity, which will eliminate the need for specialized, stand-alone devices for TV streaming. A recent paper by Strelcyk et al reported that although TV listening was important and relevant for the hearing aid users they surveyed, few understood or made program changes to specialized settings for use with television.[26] Technology in the future will need to "flow" effortlessly to be adopted, and will require immediacy, personalization, interpretation, and accessibility. Audiologists can serve a vital role in all these areas, through use of demonstration, clear counseling, and follow-up to ensure understanding. Much has been made of the impact of consumer electronics to open up the hearing aid market. An alternative interpretation may be the reality of using professionally fit hearing aids to connect seamlessly to other consumer electronics, in turn providing the best of both worlds in ways that we do not accomplish today.

SCREENING

Rather than referring to examining for the presence of hearing loss, this force refers to digital "screens" in the form of display monitors, tablet screens, and smartphones. According to Kelly,[25] we live in an increasingly visual world, with digital display manufacturers cranking out 3.8 billion new additional screens per year. Now that nearly every hearing aid dispensed in the United States in 2016 is digital, and with two-thirds of Americans owning a smartphone,[27] it creates opportunities for audiologists to provide both face-to-face and telehealth support to their patients. Telehealth is central to the trifecta of health care: better population health, improved patient care, and lower costs. In a sense, professionally delivered telehealth services provide the opportunity to achieve the objectives set by the NIDCD, PCAST, and FDA while still preserving the role of the practitioner. By combining face time in the

clinic with screen time in between, the private practitioner may improve access, efficiency, outcome, and satisfaction with a generation of patients accustomed to virtual reality. The baby boomers will demand the convenience of synchronous and asynchronous models of telehealth to meet their lifestyle needs, and the private practitioner is in an ideal position to pivot to the use of this modality. Furthermore, because the majority of hearing aids sold in the United States remain private pay, applications for concierge care that bundles different types of professional services into a single package are possible.

ACCESSING

Tom Goodwin recently observed that "Uber, the world's largest taxi company, owns no vehicles. Facebook, the world's most popular media owner, creates no content. Alibaba, the most valuable retailer, has no inventory. And Airbnb, the world's largest accommodation provider, owns no real estate. Something interesting is happening."[28] In the emerging digital world, possession is not as important as it once was; accessing is more important than ever. How will the hearing aid market adapt? It is possible that, instead of a major *purchase* made every 5 to 7 years, *leasing* options will develop that provide for a monthly fee that covers product, battery, upgrades, and services. It is not inconceivable that in the future, today's hearable devices (e.g., Apple AirPods, Samsung Gear IconX) could be included in the phone purchase and paid for via a monthly service contract. Lower up-front costs to the consumer, in combination with several of the 12 forces, will provide the opportunity to forge in new directions that *may* commoditize the product, but not the professional service. In this way, it may be possible to build more loyalty to the practitioner than the product. The switch from "ownership that you purchase" to "access you subscribe to" overturns many conventions, and private practitioners can pivot more easily than large clinics to this type of approach.

SHARING

In addition to the change from *ownership* to *subscription* in the digital economy, another trend has been toward *free* through sharing or collaboration. The implications for private practice include the opportunities to share ideas, concepts, wearing tips with patients via open or private social media platforms, like Facebook, YouTube, Twitter, and Instagram. Furthermore, cooperation with current patients to assist in marketing to prospective patients is a high-impact, low-cost marketing tool. Organized collaboration and collectivism provides an opportunity to work with local businesses and charities to rate the ambience of dining establishments in terms of noise/reverberation levels, seating recommendations, and lighting for optimal communication. Finally, the opportunity to become a local, regional, or national expert on hearing loss prevention, ototoxicity, tinnitus management is enhanced by the sharing culture. Today's crowdsourcing was yesterday's networking for the practitioner.

FILTERING

There has never been a better time to live for information junkies; a mountain of digital content is created each year. Kelly points out that every 12 months, 8 million new songs are produced, 2 million books are published, 16,000 films are made, and 30 million blog posts are published.[24] If the *Internet of things* connects electronic devices, increasingly people are connected to the online *library of everything*. This seemingly infinite array of choices is overwhelming to many, and private practitioners have the opportunity to serve as professional filters to personalize and optimize choices for their patients. This is not possible without trust, engagement, and investment of time that exceeds patient expectation. Within audiology private practice, the specific opportunities for filtering include concierge care, as mentioned previously, in which the patient pays an annual fee or retainer in exchange for personalized/enhanced care by limiting patient loads to ensure adequate time and availability for each patient.

Another opportunity for filtering is via the use of technology, in the form of telehealth, Web-, app-, or text-based based approaches to customize, personalize, or even "gamify" the process of aural rehabilitation, tinnitus therapy, or other ongoing care that may use technology to assist patients with forming healthy habits using

a combination of support mechanisms in an adaptive framework. Furthermore, the use of technology to provide momentary feedback in real time during the hearing aid trial period may assist professionals in addressing fitting/follow-up challenges early in the process, rather than the defined clinical visits (e.g., 2-week follow-up visit). This may, in turn, reduce return-for-credit rates and improve user satisfaction ratings.

REMIXING

According to Brian Arthur,[29] all new technologies derive from a combination of existing ones that have been rearranged and remixed in novel ways. Whether audiologists like it or not, the Apple AirPods, Samsung Gear IconX, or Bragi Dash may be repurposed with applications like Ear Machine (Bose Corporation, Framingham, MA) to create customized OTC devices if/when the FDA creates a new category of device. Entrepreneurial clinicians will decide whether they will choose to use these types of products and devices as lead generation tools for future patients, by providing technical support on a fee-for-service basis with these starter devices. Wu et al remixed a software/cloud recording-based device originally intended for use in infant children for their study of real-world speech listening environments in adults.[30,31] Similar opportunities exist for combining hearing aid devices with third-party app developers to invent new research, clinical, and practice technologies that do not currently exist. During the next 30 years, the most important inventions and clinical tools will likely be the ones that have been remixed most successfully.

INTERACTING

Virtual reality (VR) is an artificial world that feels *authentic*. Currently, many VR approaches are heavily visually based, with audio as an afterthought. Similarly, the audio demonstrations used in many clinical settings do not replicate the real-world environment experienced by many patients when they wear their hearing aids. Two strategies for improving interactions with hearing aids are to focus more on externalization of sound with binaural hearing aids and also to move from practitioner-based to patient-based or patient-driven fittings.

Despite the fact that the United States has one of the highest binaural hearing aid fitting rates in the world,[13] many clinicians pay little or no attention to whether the hearing aids selected preserve localization, minimize occlusion, and create the perception of externalized sound, rather than one that originates in the head. Increasingly, hearing aid technology will evolve from lo-fi to hi-fi devices that preserves (or restores) 3-D audio, at least for those with adequate residual auditory area to take advantage of high-frequency cues necessary to achieve this result.

Currently, many clinicians cling to the practitioner-based, real-ear measurement-based assumption that a match to prescriptive target ensures a successful outcome. Although this is a great starting point, technologies will continue to emerge in the future that will permit greater interaction/adjustment by the patient in real-world environments. Historically, this has often been perceived as a threat to the role of the professional, but the inevitable force of interacting will require a change in attitude and actually augment the role of the professional by facilitating greater patient control to assist with optimizing outcomes. The convergence of maximum interaction and maximum patient control will override professional insecurity and provide differentiation for the practitioners who are willing to cede control. In the coming years, anything that is not intensely interactive will not be considered state of the art.

TRACKING

Scientific tracking and self-measurement via digital sensors has become far more convenient, less expensive, and widely available through the use of biometric tracking devices. These tiny recording devices have started to change our ideas of medicine, health, and human behavior. Currently, the majority of devices that track steps, sleep, and heart rate are in the form of wearable devices, typically worn on the wrist. The dirty secret of wearables, however, is that although 1 in 10 Americans over the age of 18 own an activity tracker, nearly half abandon their use after 12 months.[32] It turns out that the ear serves as remarkably good real estate for tracking temperature, heart rate, steps, electroencephalogram, and respiration. The hearable device was created because many people want to track

biometric activity while they are exercising,[33] when they also want to stream audio from TV or a media device. Future applications will permit the next generation of data-logging instruments that provide acoustic information from various listening environments, as well as measures of social interaction subsequent to being fitted with hearing aids. In turn, this life-streaming information will provide clinicians with increasingly detailed longitudinal data regarding the impact of hearing technology. The personal archive of information may be used to detail comorbidity between hearing loss and cardiovascular disease or cognitive decline. Plus, more widespread use of wireless audio devices will help reduce stigma for hearing aids and provide opportunity for clinicians to employ customized solutions for hearable devices. The biggest obstacle remains the need for privacy; we are on our way to manufacturing 54 billion sensors every year by 2020.[34] Certainly, this will require privacy solutions that we cannot yet anticipate.

QUESTIONING

We have always had questions. Before Google or Wikipedia, the largest answering business was telephone directory assistance. The printed version was the Yellow Pages. Today, the number of reference databases to answer questions about general topics on hearing, where to get hearing aids, how satisfied patients are with clinic services, and a host of other questions are available online or through applications like Healthgrades, Yelp, RateMDs, AngiesList, Vitals, and a host of other Web sites. In the past, questions such as "Why are hearing aids so expensive?" or "Where should I get my hearing tested?" would be either more hierarchical or dependent on a physician, family member, or acquaintance. Society is increasingly moving away from a rigid order of hierarchy toward the fluidity of decentralization and search engine optimization. Questioning will be seen as the mechanism that generates new disciplines, new brands, and new possibilities.

BEGINNING

The final technological force of the future is, ironically, beginning. The future of technology will likely not be either utopian or dystopian. Rather, it will likely be protopian, with slight incremental improvements due to the interactions between all 12 forces, creating combinations that we cannot see from today.

SUMMARY

The future of private practice audiology should first and foremost be focused on the needs of the patient and on hearing as an important health condition. By raising awareness for the importance of healthy hearing in the aging population, we will achieve the objectives of the PCAST, IOM/NASEM, NIDCD, and FDA to improve accessibility and affordability for the population with hearing loss.

The aging baby boomer generation will require different approaches than the ones used during the past 30 years. To be successful, practitioners will need to consider innovation strategies that employ combinations between technology and service, employing some/all of the 12 technological forces discussed in this article. Rather than waiting for disruptive innovation to commoditize the role of the clinician, self-disruptive innovation will provide solutions that are less dependent on the device alone, and more on the benefits of our professional service.

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