Audiology Assistants: Results of a Multicenter Survey

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Abstract

Background: Although audiologists have been using support personnel for over 45 yr, controversy and variability continue with respect to the entry-level education, training methods, and scope of practice.

Purpose: As part of a larger clinical practices survey, this report focuses on use of audiology assistants (AAs) for pediatric settings and ''life-span'' facilities that had a significant population of pediatric patients.

Research Design: A questionnaire was sent to 116 facilities in geographically diverse locations. Of the 25 surveys returned, 22 had sufficient data to be included for analysis purposes.

Results: The majority of respondents assigned duties to AAs as follows: assisting with conditioned play audiometry and visual reinforcement audiometry, infection control, mail management, disposing of protected health information, ordering supplies, calling families, fielding family phone calls, and stocking supplies. In addition, of the nine pediatric facilities that used AAs and reported job duties, the majority assigned troubleshooting equipment and auditory brainstem response (ABR) screening. Two of the five life-span facilities that reported job duties assigned several duties not assigned by any of the pediatric facilities: pure-tone screening, earmold impressions, assisting with videonystagmography and ABR, and in-house hearing aid repairs. Of facilities that use AAs and reported staffing, the ratio of AAs to audiologists ranged from 0.03:1 to 1:0.37, with an average of 0.15 for life-span facilities and 0.17 for the pediatric facilities. Minimum educational levels required were reported as follows: high school (n = 8), college (n = 3), certificate (n = 1), and no requirement (n = 1).

Conclusions: Within a small sample size of pediatric and life-span facilities, 14 of 22 centers used AAs to perform a variety of direct patient care, indirect patient care, and clerical duties. Based on the duties recommended within the American Speech-Language-Hearing Association guidelines and by many states, expanded employment of AAs, as well as expansion of assigned duties should be considered. Data are needed to determine the appropriate ratio of AAs to audiologists within different settings and to determine the impact of AAs for accessibility, productivity, and profitability.

Key Words: audiology assistant, pediatric audiology, productivity, support personnel

Abbreviations: AA = audiology assistant; ABR = auditory brainstem response; ASHA = American Speech-Language-Hearing Association; AuD = Doctor of Audiology; CPA = conditioned play audiometry; FTE = full time equivalent; HA = hearing aid; VA = Veterans Administration; VNG = videonystagmography; VRA = visual reinforcement audiometry

INTRODUCTION

Although much has been discussed and written during the past 20 yr regarding the use of support personnel in audiology, controversy remains regarding the appropriate scope of duties, as well as education and training. The American Speech-Language-Hearing Association (ASHA) defines an audiology assistant (AA) as "a person who, after appropriate training and demonstration of competency, performs delegated tasks that are prescribed, directed, and supervised by a certified and/or licensed audiologist" (ASHA,

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n.d.). The title "audiology assistant" is used in many clinical practices and will be used for the current study. When describing the published work of others, the title cited in the specific report will be used.

Over 44 yr ago, Northern and Suter (1972, p. 357) stated that "[t]he use of supportive personnel will allow the certified audiologist to make a better contribution toward fulfilling the community's need for services and provide more time to perform those activities for which his extensive education has prepared him." Since audiology is a relatively young profession, it is not surprising to find divergent opinions and clinical practices regarding the use of support personnel. In contrast to other professions that make extensive use of assistants such as dentistry and optometry, the modern profession of audiology in the United States only dates back to the 1940s. The first graduate degree in audiology was granted in 1946 at Northwestern University (Lubinski and Golper, 2007). The American Speech Correction Association became ASHA in 1947, formally recognizing the increasing role of audiology. The battlefield injuries of World War II accelerated the need for audiological services due to combat-related hearing loss. A milestone for pediatric audiology came during 1949–1950 with federal funding through the Children's Bureau and Maternal and Child Health and Services for Crippled Children (Lubinski and Golper, 2007). The founding of the American Academy of Audiology in 1988 and the mandate of the clinical doctorate as the entry level in 2007 were major advances and changes in the model of audiology education that logically would be accompanied by increases in use of support personnel.

Rationale for AAs

Health-care reform drives audiologists and all health-care disciplines to provide high-quality services at "reasonable costs." Those favoring the use of support personnel claim increased productivity, profitability, and patient satisfaction as well as reduced wait times as key beneficial factors (Nemes, 2001; Kasewurm, 2005; 2006; 2008; 2013; Windmill, 2011; Shaw, 2012; Leach, 2012). Both the AAA and ASHA state that the appropriate use of AAs can improve patient care costs, productivity, and accessibility by shifting tasks and duties that were previously performed by the audiologist to the AA (Nemes, 2001; ASHA, n.d.; AAA, 2010a,b). Windmill (2011, p. 13) points out that "...in an ideal sense, the audiologist's value comes from making decisions, not conducting tests or ordering hearing aids."

Regarding accessibility, the audiologist workforce is projected to be significantly smaller than the demand for audiological services (Nemes, 2001, Freeman, 2009; Shaw, 2012; Windmill and Freeman, 2013). The increase in the elderly population in need of hearing aid (HA) services is a major impetus to increase the use of AAs (Bloom, 2009; Donahue et al, 2010; Windmill and Freeman, 2013). With respect to pediatric audiology, which is a major focus of the current study, the advent of universal newborn hearing screening, increased survival rates for childhood cancer (Siegel et al, 2015), children treated with aminoglycosides, greater noise exposures, and implantable devices (with more and longer appointments) have created the need for more pediatric habilitative and rehabilitative services (Windmill and Freeman, 2013).

Less frequently mentioned but of significant importance for accessibility is the use of technicians with underserved populations such as underdeveloped countries or rural areas (Northern and Suter, 1972; Shaw, 2015). Canada has had Inuit hearing specialists for over 25 yr (Ayukawa and Roy, 2014; Billard, 2014). The Inuit hearing program highlights the benefits of a health-care worker who can speak the language and understand the culture of the patient and/or family. The language barrier is acute in audiology, which has relatively few bilingual professionals. Of ASHA-certified audiologists, only 5.6% define themselves as bilingual service providers (ASHA, 2016). Another program in remote Canada used a "native technician" to provide basic testing, keep records, troubleshoot HAs, make earmold impressions, and provide follow-up (Williams, 1980; Williams and Varette-Cerre, 1990). Although there may be fewer remote areas in the United States than in some other countries, 20% of Americans live in rural areas (Donahue et al, 2010). Shaw (2015) reported a few initiatives within the United States. The University of Arizona is partnering with Mariposa Community Health Center to better serve rural areas of Arizona. Johns Hopkins Department of Otolaryngology has been working to develop a program to train and use community health workers to provide accessible, affordable basic hearing care in Baltimore. The Massachusetts Commission for the Deaf and Hard of Hearing and researchers from Boston University School of Public Health partnered to work through community health workers who make individuals aware of hearing services and help them address social and financial issues.

In a program delivering hearing health care to adults in remote regions using sophisticated technology, Australian researchers provided audiology services via telecommunication with the assistance of auxiliary personnel (Pearce et al, 2009). The hearing assistants were trained to place instrumentation for real-ear verification. Instrumentation was controlled via laptop and PcAnywhere software (Symantec-Norton, Sunnyvale, CA). Videoconferencing was used for communication between the audiologist, hearing assistant, and client. Pearce and colleagues recommended further research to assess feasibility with the pediatric population.

Surveys have yielded comments mirroring the ASHA and AAA view that AAs can improve costs, productivity, and accessibility (Berardino, 2001; Hamill and Freeman, 2001; Bloom, 2009). Specific to pediatrics, Judith Gravel stated, "I consider this a wonderful opportunity for audiology because we have technicians that we can train and supervise to administer this screening. It doesn't make good economic sense for audiologists to do the screening directly in large birthing hospitals since there are screening devices that don't need professional interpretation" (Nemes, 2001, p. 27). To sum up, Kasewurm asserted that "Assistants strengthen the profession. They allow us to serve more people while making our practices more profitable" (Bloom, 2009, p. 25).

Concerns Regarding the Use of AAs

Those who do not favor the use of AAs believe they will reduce quality of care (Doggett, 2001), eliminate positions for audiologists, and confuse patients/families (Berardino, 2001; Hamill and Freeman, 2001; Cushing, 2004). Audiologists apprehensive about losing audiology positions fear that physicians will hire AAs rather than audiologists to reduce costs (Berardino, 2001; Hamill and Freeman, 2001; Nemes, 2001; Duran, 2002) and that administrators or human resource departments will use AAs to provide services that need audiological expertise (Berardino, 2001; Cushing, 2004). In addition, there is concern about liability (Berardino, 2001) and assignment of inappropriate job duties (Berardino, 2001; Doggett, 2001; Hamill and Freeman, 2001; Bloom, 2009).

The lack of uniform job duties and standards for training and education of AAs is worrisome to many, including those in favor of the use of AAs as well as those who question or are opposed to the use of AAs (Nemes, 2001). Furthermore, there is the possibility that if audiologists do not establish control of training and supervision for audiology support personnel, other healthcare providers will train and employ AAs in lieu of audiologists (Humes and Diefendorf, 1993; Freeman, 2009). In concordance with this view, Donini-Lenhoff (2008) reports that due to the desire for greater visibility and autonomy, several committees, including those for physician assistants and ophthalmic medical technicians/technologists, have left the Commission on Accreditation of Allied Health Education Programs to form their own profession-specific accrediting bodies.

Job Responsibilities and Staffing

Audiologists are employed in a plethora of practice settings: private practice, hospitals, school systems, physicians' offices, community hearing centers, university hearing centers, managed care systems, industry, military, state agencies, home health, and rehabilitation facilities. The individuals served and services rendered vary significantly across these settings. This welcome diversity for our profession contributes to the difficulty of establishing a uniform vision for the role of the AA.

AAA lists examples of appropriate job duties, whereas ASHA provides a list of duties as shown in Table 1 (ASHA, n.d.). Both AAA and ASHA make clear that adherence to state requirements supersedes their published recommendations or guidelines. The relevant documents for each state may be located via http://www.asha.org/advocacy/state/.

There is considerable variability with respect to scope of job duties, educational requirements, supervision, and continuing education among the states. Rhode Island states that all provisions of the ASHA policy

Table 1. Job Duties for AAs

Greet and escort patients
Scheduling patients
Packaging and mailing earmold orders, device repairs, and manufacturer/laboratory returns
Maintaining inventories of supplies and checking function of equipment
Performing checks on HAs and other amplification devices
Performing troubleshooting and minor repairs to HAs, earmolds, and other amplification devices
Cleaning HAs and other amplification devices
Performing electroacoustic analysis of HAs and other amplification devices
Instructing patients in proper use and care of HAs and other amplification devices
Demonstrating alerting and assistive listening devices
Instructing patients in proper ear hygiene
Assisting audiologists in treatment programs
Assisting audiologists with setup and technical tasks
Preparing materials for ear impressions
Maintaining and restocking test and treatment rooms
Performing equipment maintenance and biological checks
Conducting hearing and tympanometric screening on older children and adults (without interpretation)
Conducting otoacoustic emission screening
Performing nondiagnostic otoscopy
Performing pure-tone audiologic reassessment on established patients
Preparing the patient for VNG/ENG or evoked testing
Assisting audiologists in hearing testing of pediatric patients
Performing pure-tone hearing screening and universal newborn hearing screening tests
Performing infection control duties within the clinic/service
Assisting patients in completing case history or other relevant forms
Interacting with hearing instrument manufacturers/suppliers regarding status of orders/repairs

Notes: Adapted from ASHA (n.d.). AAs with training from the Council for Accreditation in Occupational Hearing Conservation may perform additional duties.

regarding support personnel should be observed. Clinical duties such as scheduling and routine paperwork are among the least controversial activities. Many states allow for basic care and maintenance of HAs and other assistive devices. Florida allows the AA to conduct impedance testing and basic hearing testing, including air-conduction and bone-conduction thresholds and speech, without interpretation. Interestingly, several states have similar wording that specifies that the AA may participate with the licensed audiologist in research (eight states), in-service training (seven states), and public relations (five states).

Although many states specify the maximum number of AAs that can be supervised by one audiologist, there are currently no guidelines with respect to appropriate staffing ratios to achieve a balance between productivity and high quality. Kasewurm (2013) reported the employment of three AAs, two audiologists, and one hearing instrument specialist in one private practice setting. The Veterans Administration (VA) increased the ratio of health technicians to audiologists from 1:21 in 1996 to 1:5 in 2005. For comparison with another occupation that uses support staff, Conrad et al (2010) reported that the ratio of dental assistants to dentists was 2.7:1.0 and the average ratio of dental hygienists to dentists was 2.0:1.0. To improve consistency among state laws and decrease the possibility that AAs will be used inappropriately, a model state law is needed for advocacy efforts.

Training and Education of AAs

With respect to education of the AA, ASHA defers to the standards of the states and AAA states that formal training is efficient, but not necessary and that training programs should focus on practical education (AAA, 2010a). In 2010, the AAA Task Force stated that college credit for AA training is not appropriate. Of the states specifying a minimum educational level, the requirement varies from high school diploma to bachelor's degree. Of note, Texas recently lowered the requirement for AAs from a bachelor's degree in speech and hearing with 12 hr of audiology coursework to a high school diploma or equivalent, plus successful completion of a course in occupational hearing conservation (Dionne, 2016).

Hamill and Freeman (2001) surveyed the opinions of 346 audiologists recruited through AAA and the Florida Academy of Audiology. Approximately 36% of the respondents favored on-the-job training for AAs and 50% recommended a combination of audiologist supervision combined with university training. The remaining 14% of respondents favored a university conducting all training. Of respondents who recommended either partnering with a university or an independent university training program, 42% felt that an associate's degree was most appropriate, 11% preferred a bachelor's degree, 32% recommended certification of training, and 15% expressed no preference or were uncertain. Tucker (2001) recommended that universities with audiology programs establish educational curricula for AAs to ensure the quality of training and extent of training.

Despite this apparent preference for university training, there are few formal training programs available at this time. One of the earlier attempts to establish a coordinated training program was the joint project between the National Association of Hearing and Speech Agencies, the Department of Health, Education and Welfare, and the Department of Defense, which graduated some audiometric assistants in November 1971 (Northern and Suter, 1972). Similar to some of the current programs, the joint project included lecture (15 hr), laboratory exercises (240 hr), audiometric experience (200 hr), written examination, and four months of work experience supervised by a certified audiologist. Curricula were designed to produce audiometric assistants who could perform air conduction and bone conduction as well as speech audiometry (Northern and Suter, 1972).

Existing formal training programs enrolling participants as of January 2016 that have readily available information include Nova Southeastern University; the Certificate Program for Otolaryngology Personnel; the American Institute of Continuing Medical Education, offering the Hearing Care Technician Certificate; and the Council for Accreditation in Occupational Hearing Conservation. The VA and army/military have training programs, but the materials are not readily available to the public. (See Supplemental Appendix S1, supplemental to the online version of this article, for further details of the individual programs.) In addition, The Dominican Republic worked with Medical Ministry International and the Universidad Frederico Henriquez to develop an accepted university 2-yr audiology program for audiology technicians (Carkeet et al, 2014).

Continuing Education

Beyond initial training, there is the question of whether AAs should have formal continuing education. Several states require continuing education for AAs. ASHA has an affiliate program open to AAs who are currently employed in support positions providing assistant services and who work under the supervision of an ASHA-certified audiologist (CCC-A). This means that AAs who are affiliates have access to all of the educational programs and materials of ASHA. The AAA position statement written by the Audiology Assistant Task Force is neutral with respect to membership in the AAA (AAA, 2010a). In a private practice, Kasewurm

(2013) provides monthly training on new procedures, software, and customer service and has also recommended training by HA manufacturers (Nemes, 2001). Interestingly, the VA promotes joining a professional organization as useful in maintaining an awareness of developments in the field (VA, n.d.).

Evidence Regarding the Efficacy of AAs

Several surveys have provided opinions of audiologists, and in some cases otolaryngologists, with respect to a wide range of potential duties for AA (Berardino, 2001; Hamill and Freeman, 2001; Duran, 2002, Cushing, 2004). Beyond opinion surveys and testimonials, data on the use and efficacy of AAs are sparse. Vuorialho et al (2006) did a cost analysis and found that follow-up counseling of new HA users by an experienced assistant is highly cost effective. There is a clear need for research to elucidate the financial contribution of AAs.

Saccone and Steiger (2008) reported on the efficacy of AAs using a HA protocol designed to facilitate appropriate care and treatment for patients with HAs in the VA setting. The use of AAs resulted in increased manufacturer repairs and audiologist consults for weak aids. In contrast, in-house repairs and changes to the gain/frequency response decreased. The authors hypothesize that the protocol allowed more patients to leave the clinic with HAs that had been verified to be functioning as programmed. In addition, the increase in audiology consults was viewed as a positive outcome because they believed the AAs were better able to consider changes in hearing status and did not attempt to resolve situations beyond their scope of practice.

Kasewurm (2013) reported that in her private practice, AAs performed 23% of the HA repairs, 62% of the HA cleanings, 4% of the minor HA adjustments, 3% of modifications, and 8% of the pickup repairs. As a result of using AAs, she stated that the hearing health professionals have more time to accommodate new patients, counsel patients, and program or reprogram hearing devices. Supporting this view, Windmill (2011, p. 13) points out that ideally the audiologist's "value comes from making decisions, not conducting tests or ordering hearing aids."

In contrast to Kasewurm (2013), who employs an HA dispenser in her private practice, Roeser (2012) expressed misgivings regarding the growing trend of licensed HA dispensers being sponsored and hired in lieu of AAs and stated that this practice "trivializes" the training and skills needed for hearing instrument competency. Furthermore, such individuals, by virtue of their licensure, become independent practitioners for whom supervision is not required by the state.

Some audiologists are concerned that otolaryngologists may hire assistants to perform diagnostic testing that is traditionally administered by audiologists (Duran, 2002). If audiologists and physicians hire technicians rather than audiologists, this is seen by some as a threat to their position and/or the profession (Berardino 2001; Nemes, 2001). Some audiologists are apprehensive that inappropriate task assignment will lead to decreased quality of patient care.

Reimbursement for services provided by the AA is a concern, particularly in settings where a significant amount of direct-contact services are provided. In the case of physical therapy and occupational therapy assistants, services rendered are billable because they are credentialed and defined in the regulations. There is a cautionary note with regard to reimbursement. Medicare and other insurers may determine their reimbursement rate assuming that lower cost support personnel are in the equation (Paul-Brown and Goldberg, 2001).

Although these background materials on audiologist viewpoints, licensure, guidelines, and training programs provide information about the wide variability and use of AAs, we could find no information specific to the pediatric population, which has experienced significant growth since the advent of universal newborn hearing screening. Thus, this study was designed to focus on the actual practices of AAs in pediatric and "lifespan" settings with a large focus on pediatric care. In addition to job duties, data were obtained with respect to educational requirements for the AAs, number of patient visits, and staffing ratios between AAs and audiologists.

METHODS

The institutional review board of Cincinnati Children's Hospital approved this study, and Washington University, St. Louis, was approved as an external collaborating site. Data were collected and analyzed based on responses to a subset of questions from a larger, 72-question, 24-page survey that included the following areas of inquiry: facility information, productivity measures and targets, productivity measure details, scheduling, second tester, interdisciplinary relationships, AAs and externs, research, and future collaboration. Questions were primarily multiple choice or fill in the blank. Multiple-choice questions included a comment box for additional information. Survey questions were developed by audiologists and business professionals from the Children's Hospital of Philadelphia, St. Louis Children's Hospital, and Cincinnati Children's Hospital Medical Center. Before distributing the survey nationally, a pilot version was sent to eight facilities, and some questions were added, deleted, or refined after input from these sites.

The survey was sent to 116 managers and directors of audiology departments/divisions within major pediatric

facilities or facilities that provide services to all ages, but have a large pediatric focus. The survey was administered via SurveyMonkey in November 2014. Participants were advised to complete the 1- to 2-hr survey in one sitting because the ability to reenter the survey was inconsistently dependent on Internet settings. In recognition of survey participants' time and effort in completing the survey, aggregate, deidentified survey results were shared with the survey respondents before presentation and publication.

RESULTS

Thirteen audiologists responded by January 2015, and follow-up e-mails were written to nonrespondents encouraging them to respond. In total, 25 surveys were returned from 16 pediatric and 9 pediatric-plus-adult (life-span) facilities. Three facilities provided limited data and thus were not included in analyses. Several respondents skipped certain questions and sections. Therefore, the sample size varies, depending on the study question. In cases where data did not make logical sense to the authors, they sought clarification via e-mail from the respondents. If clarification was not achieved, data for that question were eliminated from the analysis.

The 22 respondents who submitted adequate data were geographically diverse with representation as follows: Alabama (n = 1), California (n = 1), Georgia (n = 1), Massachusetts (n = 1), Missouri (n = 3), Nebraska (n = 1), New Jersey (n = 2), New Mexico (n = 1), New York (n = 1), North Carolina (n = 1), Ohio (n = 2), Pennsylvania (n = 1), Tennessee (n = 2), Texas (n = 2), Virginia (n = 1), and Washington State (n = 1).

Of the 22 completed surveys, 13 institutions reported using AAs, and responded to the minimum education level question. These sites reported educational requirements as follows: high school diploma (n = 8), college degree (n = 3) (with one specifying an associate degree), certificate (n = 1), and no requirement (n = 1).

Assigned AA duties by facility type are shown in Figure 1. Nine of the ten pediatric facilities that employed AAs reported job duties as follows: assisting with conditioned play audiometry (CPA) and visual reinforcement audiometry (VRA), stocking supplies, calling families, troubleshooting equipment, ordering supplies, infection control, fielding family phone calls, disposing of private health information, managing mail, and auditory brainstem response (ABR) screening. Duties assigned by one (11%) to four (44%) of the nine facilities were as follows: cover front desk, process "return merchandise authorization for cochlear implant," HA repair, immittance, otoacoustic emission screening, set HA postrepair, maintain database for HAs, and scheduling. None of these nine pediatric facilities assigned AAs to the following tasks: in-house HA repairs, assisting with diagnostic ABR, assisting with videonystagmography (VNG) assessment, earmold impressions, or pure-tone screening.

The five life-span facilities that employed AAs showed a slightly different pattern. Two life-span facilities assigned several duties that none of the pediatric facilities assigned: pure-tone screening, earmold impressions, assist with VNG, assist with ABR, and in-house HA repairs. The majority of life-span facilities assigned the following: earmold orders, scheduling, managing mail, disposing of protected health information, fielding family calls, infection control, ordering supplies, calling families, stocking supplies, and assisting with CPA/VRA.

Figure 2 illustrates the ratio of AAs and nonclinical support staff to audiologists for the 22 facilities that reported staffing data. Results were variable for use of AAs, ranging from a low of 0.0 (8 facilities of 22 did not report use of AAs) to a high of 0.37 AA (site 10) for every one full time equivalent (FTE) audiologist. For facilities reporting use of AAs, the average was 0.15 for life-span facilities and 0.18 for the pediatric facilities. Thus, use of AAs for both life-span and pediatric facilities was extremely limited, with one assistant for every six audiologists on average. In general, facilities reported higher use for nonclinical support staff than AAs; however, four sites reported no support staff, despite having up to 13 FTE audiologists. The range for support staff to audiologist ratios was from 0.0 to a high of 1.38 for every one FTE audiologist.

The relationship between productivity, based on the number of annual patient visits per audiologist, and the use of AAs and nonclinical support staff was explored, as shown in Figures 3 and 4. As noted earlier, facilities did not always provide complete or definitive data for staffing or patient visits. If data were incomplete or unclear for the number of AAs or nonclinical support staff, they were excluded from the corresponding figure. Of the 22 surveys, corresponding data were available for patient visits and productivity from 18 sites. Both Figures 3 and 4 show the large variability in the number of annual patient visits per audiologist FTE, from a low of 400 patients per audiologist to a high of 2,280 visits per audiologist. Two facilities were outliers, reporting 1,680 and 2,280 annual patient visits per audiologist (see Figure 3). However, annual patient visits per audiologist were still highly variable for the remainder of sites, ranging from 400 to 1,312 annual visits.

Figure 3 depicts productivity (annual patient visits per audiologist) as a function of the ratio of AAs to audiologist FTE. For this small sample, the use of AAs did not appear to be related to productivity for pediatric or life-span facilities. A similar relationship was explored for use of nonclinical support staff and productivity, as shown in Figure 4. Again, there was no apparent

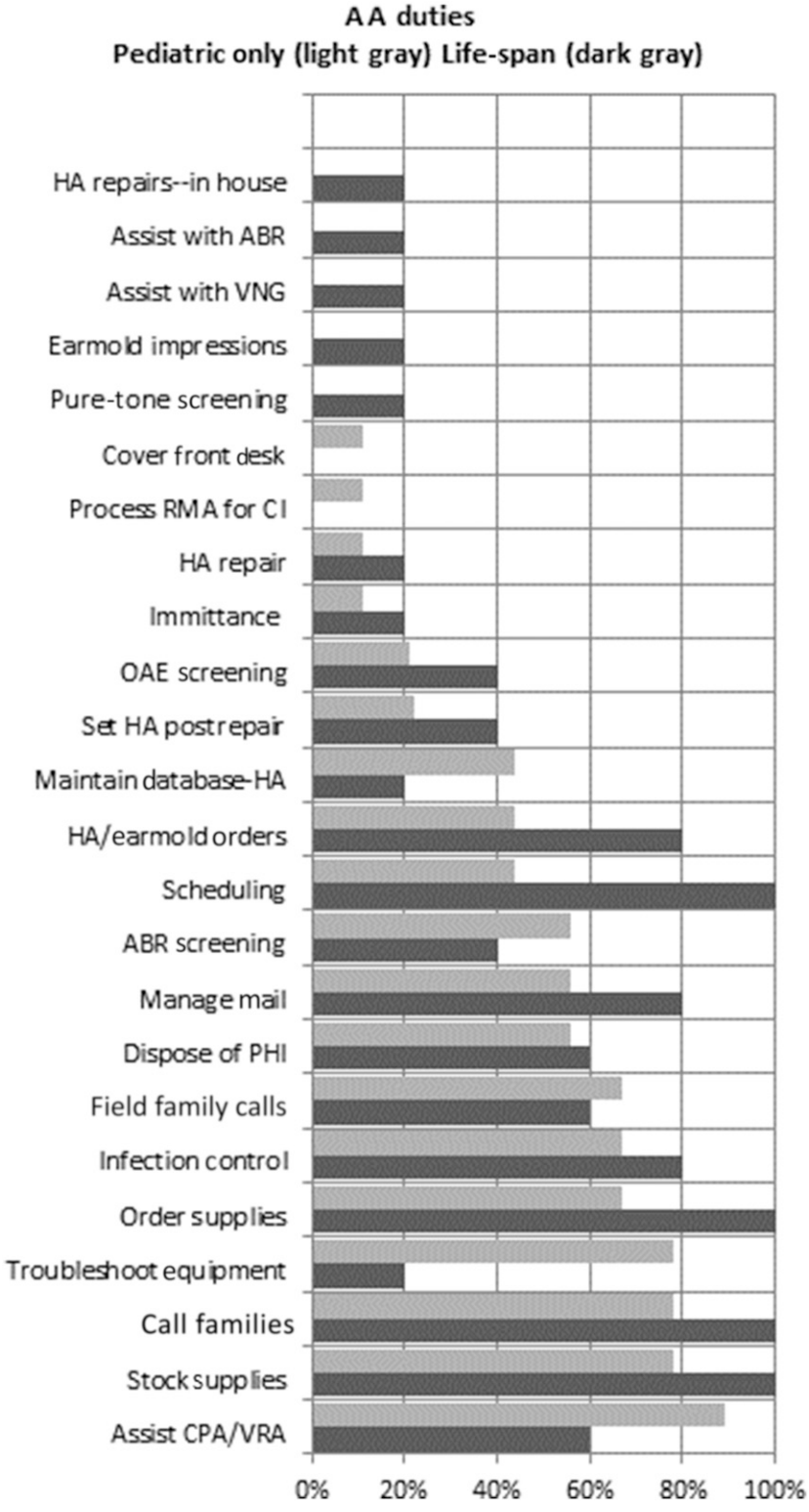

Figure 1. AA duties by type of facility. Percentages represent results of five life-span and nine pediatric facilities. CI = cochlear implant; OAE = otoacoustic emission; PHI = protected health information; RMA = return merchandise authorization.

relationship between nonclinical support staffing and productivity as measured by patient visits for pediatric or life-span facilities. The two highest productivity sites, with 1,680 and 2,280 patient visits per audiologist, did not report using either AAs or nonclinical support staff.

To better understand the relationship between staffing of AAs and productivity, it is important to consider

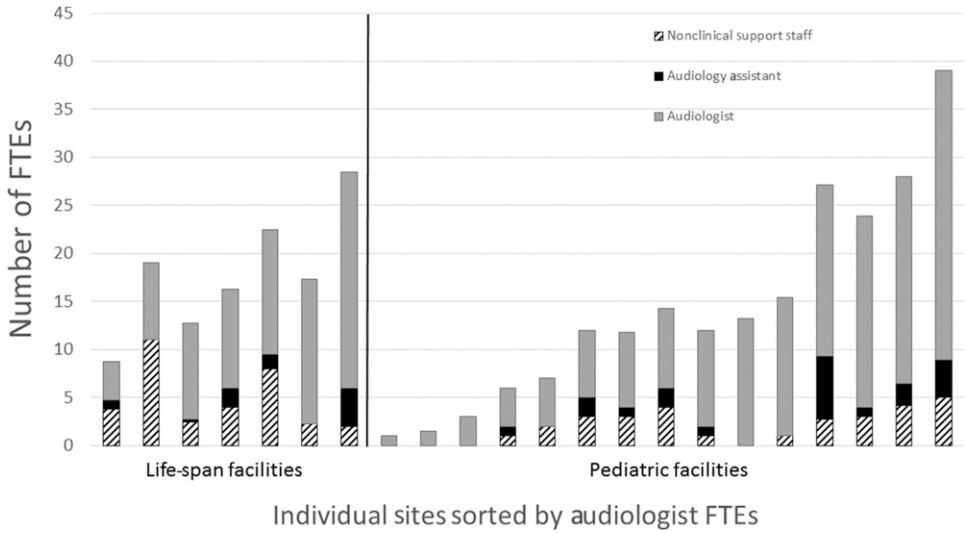

Figure 2. Ratio of nonclinical support staff and AAs to audiologists, based on FTE for life-span and pediatric facilities.

other sources of assistance. In addition to the use of nonclinical support staff, students and other audiologists are an alternative source of assistance for audiologists in certain situations, particularly in pediatric assessment. Of the six facilities that did not report using AAs as the second tester for CPA/VRA, all six reported that they use a second audiologist or a graduate student. One of the six used an office assistant and one of the six used the parent or an office assistant. Interestingly, one facility reported that a second tester is not approved by the institution.

DISCUSSION

Of the 22 facilities responding to the survey (15 pediatric and 7 life-span facilities), the majority of both types of facilities assigned AA duties as follows: assist with CPA/VRA, infection control, manage mail, dispose of private health information, order supplies, call families, and stock supplies. Thus, the majority of these duties are clerical in nature with some assistance with clinical duties. AAs in some life-span facilities, but not pediatric centers, completed in-house HA repairs, assisted with ABR or VNG, conducted pure-tone screening, and made earmold impressions. Given the breadth of duties supported by ASHA, AAA, and many states, expansion of the scope of duties should be considered, since this survey indicates much more limited use of AAs. Since the discussion on AAs began in audiology some decades ago, advances in automated equipment and tele-audiology increase the possible job duties that could be assigned to AAs. These automated procedures

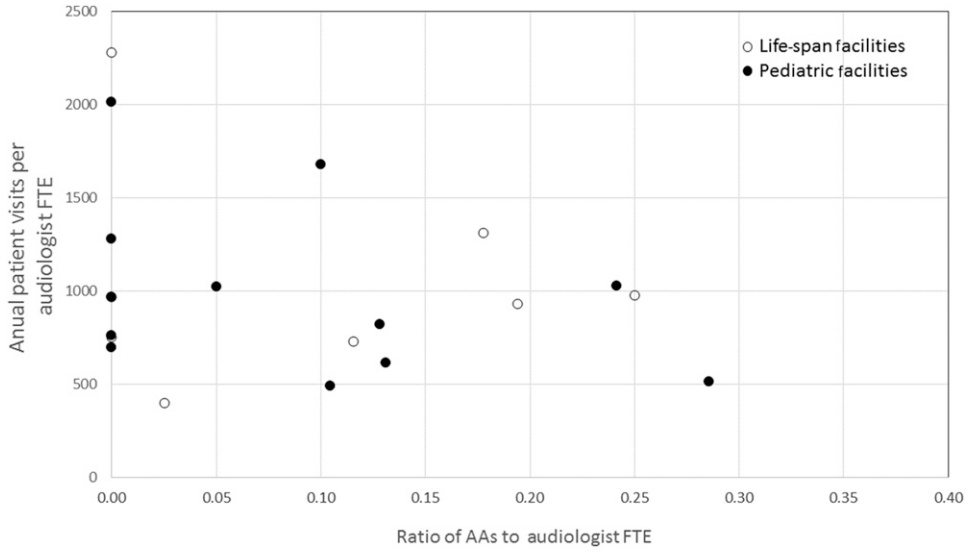

Figure 3. Annual patient visits per audiologist (productivity; vertical axis) plotted as a function of the ratio of AAs to audiologists (horizontal axis).

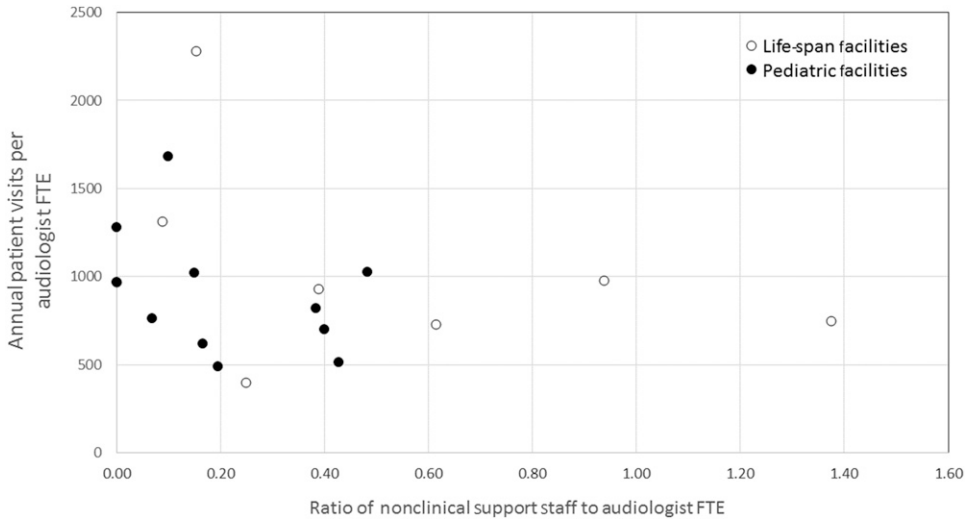

Figure 4. Annual patient visits per audiologist (productivity; vertical axis) plotted as a function of the ratio of nonclinical support staff to audiologists (horizontal axis).

often provide objective data by which AA performance could be assessed. Currently, it appears that AA duties are primarily added on to clerical job duties, rather than as a defined AA position.

Envisioning a future of increased access to audiological care, improved salaries, and enhanced job satisfaction, consideration should be given to the use of AAs in outreach and telepractice situations. To serve rural communities and even suburban areas cost effectively and efficiently, using AAs to perform preliminary and/or routine tasks should also be given consideration. The advent of automated equipment and telepractice, which has been used effectively in a variety of audiological situations, facilitates the appropriate use of AAs within audiology. Finally, it appears that on-site training of AAs should be specific to the clinical practice's needs. The nature and scope of AA responsibilities should differ depending on the setting: pediatrics, adults, private practice, military, hospitals, academic clinics, etc.

The ratios reported in this study are much lower than the established use of support personnel in other fields such as physical therapy, optometry, dentistry, and medicine. Again, this suggests the opportunity to expand the scope of duties and increase the use of AAs within our practices, if they can be employed in an efficient manner that contributes to patient outcomes by following standardized protocols established by a managing audiologist. Additionally, if a significant proportion of AA duties are in fact clerical, then assistance with clinical duties is even lower than these survey numbers suggest. As cited in a white paper on productivity and the health-care workforce by the New America Foundation, the health-care sector in the United States spends approximately three times as much on paperwork and other administrative activities as does Canada (Brownlee et al, 2016). Brownlee and colleagues point out that these administrative tasks waste the time of highly trained providers with primary care physicians, physician's assistants, and hospital nurses spending many hours a day doing paperwork rather than directly caring for patients.

The level of education and training of assistants is a factor for assignment of AA duties. The majority of facilities surveyed that hire AAs required a high school education. However, three facilities required a college degree (with one specifying associate degree). This variability in educational level mirrors that found among the state requirements. The AA position may be of interest to those who have undergraduate coursework or degrees, but are unable to pursue graduate degrees in communication sciences. AAs with this undergraduate background may require less training and be able to handle a wider scope of duties.

Our expectation was that a higher level of education required by the site would be associated with either more assigned duties or more clinical duties. Since some states require that college-level coursework in speech and hearing be taken, this seemed plausible. However, the data, though limited by a small sample size, did not support this hypothesis. With respect to the number of duties, the 3 sites requiring college coursework assigned an average of 6 (range 5–8) and the 8 sites requiring high school education assigned an average of 10 (range 6–15). Examination of the assigned duties suggested that the college requirement did not lead to more clinical duties with a higher responsibility level. Two of the sites requiring a high school education assigned setting HAs postrepair. In contrast, none of the sites requiring college education assigned this primarily clinical duty. The site that assigned the most duties, both clerical and clinical, required a certificate. This site assigned 16 duties overall, including immittance measures, HA

repair, earmold impressions, setting HAs postrepair, and assisting with VNG and ABR. Of note, this site is located within a state that does not regulate AAs.

Whether AAs are trained on-the-job by a supervising audiologist and/or receive formal training is also a consideration for assessing and ensuring competency for AA skills. The military and VAs have training programs available to their employees. Programs with more open enrollment include Nova Southeastern University, the Certificate Program for Otolaryngology Personnel, the American Institute of Continuing Medical Education (Hearing Care Technician Certificate), and the Council for Accreditation in Occupational Hearing Conservation. It should be noted that audiologists are usually hired because they are skilled at assessment and counseling. They may or may not be skilled at training AAs. Therefore, having formal training with a core curriculum and specialized electives may be a reasonable approach to accommodate the varied needs of different practice settings.

Regardless of educational level and training, the predominant mandate is that the supervising audiologist is responsible for the work performed by the AA. In response to this need, the ACAE (2016) has recently included a standard for training students in Doctor of Audiology (AuD) programs on ethical and effective use of AAs in their AuD programs, stating that: "The student will be able to direct the appropriate and ethical use of audiology assistants and other staff in order to manage productivity and effectiveness within the scope of audiologic practice" (p. 9).

With respect to the use of AAs to assist with testing, whether that is CPA, VRA, ABR, or VNG testing, data and comments from other portions of the survey suggested that the extent and frequency of AAs performing direct patient care activities may be influenced by the presence of fourth-year externs and other factors. For example, one institution was within a university setting and reported that they used graduate students to assist with testing. The use of fourth-year externs is a relatively recent phenomenon, with the institution of the AuD as the entry-level degree in 2007. The percentage of time/effort that fourth-year externs spend performing duties within the scope of AAs is a factor in the employment of AAs and the productivity of audiologists. AuD educational programs should address this issue by clarifying the extent to which it is appropriate for AuD students to perform AA duties, particularly those of a clerical nature. In addition, AuD students should be trained for future supervision of AAs.

Theoretically, we expected that greater use of AAs would result in higher productivity. However, it appears that productivity was not associated with greater use of either AAs or nonclinical support staff in this small sample. In fact, the two highest productivity sites did not report using either AAs or nonclinical support staff. What accounts for this paradoxical finding? Preliminary examination of practice factors in the larger survey provided some clues. The facilities that had higher productivity tended to not schedule a second tester for audiological assessments and had lower no-show rates.

Although the focus of this study was AAs, much additional data are available from the overall survey. We are exploring key variables that may have contributed to the lack of a direct relationship between AAs and productivity including the following: patient complexity, audiologist time spent on nonclinical work such as paperwork and phone calls, clinical time reported by managers, time reported for procedure codes, no-show rates, use of overbooking, use of a second audiologist to test infants and children, scheduling of second testers, other scheduling practices, walk-in practices for otolaryngology clinics, and otolaryngology clinic volumes. A full report of these and other clinical practice results is in preparation.

The survey responses allowed exploration of the impact of state regulation of AAs on whether an AA was on staff. Of the eight sites with no AAs, four were in states with regulation and four were in states without regulation of AAs. Of the 13 sites with AAs, 10 (77%) were in states with regulation and only 3 (23%) were in states without regulation. Within these 13 sites, 1 was in a state that regulated audiometric technicians through the Council for Accreditation of Occupational Hearing Conservation. It is plausible that the states with more active advocacy by audiologists regarding AAs have worked to have state regulation in place to guide safe and ethical practice.

In contrast to the impact regulation appeared to have on the hiring of AAs, state regulation did not seem to impact the number of assigned job duties. Excluding the site in the state with regulation of audiometric technicians, the three sites in states that did not regulate AAs assigned an average of 9.8 tasks (range 5–16); the nine sites in states that regulate AAs assigned an average of 10.3 duties (range 6–13). The survey only had four sites that assigned setting of HAs postrepair (a more clinical duty) to AAs. Of the four sites that assigned this duty, three were in regulated states and one was in a state that does not regulate AAs. More data are needed from future studies to further address this question.

Before hiring or assigning duties to AAs, supervising audiologists should check their state requirements. For states with regulation, there is much variation in the depth and breadth of the requirements. For example, Nebraska and Pennsylvania provide a specific list of AA duties. AAs in Nebraska are permitted to provide aural rehabilitation if specified training is completed. Pennsylvania provides a specific list of AA duties and also specifies that all provisions of the ASHA policy regarding support personnel be observed.

If AAs are not regulated, as is currently the case for New Jersey, New Mexico, New York, and Tennessee, supervising audiologists should consult current guidelines of both ASHA and AAA before assigning duties. An additional consideration should be the age of patients served. Since the states, as well as AAA and ASHA, do not distinguish between adult and pediatric settings, audiologists must use clinical judgment. For example, "cursory otoscopy" permitted in Delaware is very different for an adult versus an infant with newly identified hearing loss.

The trend appears to be toward more state regulation for AAs. Audiologists should lead advocacy efforts to ensure that state requirements optimally meet the needs of clinical audiologists and their patients. Reviewing and comparing existing state regulation could help determine "best practices" for incorporation into model legislation. In addition to minimum education level and scope of duties discussed in the current study, model legislation could provide guidance regarding responsibilities of the supervising audiologist and continuing education of AAs.

Regardless of whether the state regulates AAs, supervising audiologists should carefully consider training and assignment of duties because they may be held liable for any negligence on the part of their AAs. Although malpractice law is state based with considerable variation, the basic test is whether the practitioner's conduct satisfies an appropriate standard of care. Moffett and Moore (2011) state that in applying the standard-of-care test, courts have considered the following criteria: (a) customary practice, (b) reasonable practice, (c) minimal competence for a similar professional in the same situation, and (d) clinical practice guidelines. In addition, expert testimony to clarify and explain these four factors is often part of the court proceedings.

Conclusions are limited by the small number of facilities responding to the survey, and variation in what is defined as a patient visit, that is, time and number of billable procedures involved. Although respondents were geographically diverse, the type of clinical setting was primarily in hospital and medical centers. No adult or life-span private practices were included in this survey. Private practice settings serving primarily adults and having a high percentage of HA users may use higher ratios of AAs to audiologists (Kasewurm, 2013) than in this sample of hospitals and clinics.

In summary, audiology practices report great variability in AA job duties, support staff to audiologist ratios, and relative success in leveraging use of support staff to increase productivity. To make the most effective use of AAs, audiologists need education regarding AA training, supervision, and scope of practice. This could be incorporated into AuD programs and continuing education courses. AAs should be strategically used for routine tasks that are necessary and important, but do not demand advanced education and training. Optimal use of AAs could potentially improve audiological care and patient satisfaction by focusing audiologist effort on more complex tasks demanding interpretation, problem-solving, and counseling skills.

Based on these survey results, it appears that facilities that would like to improve productivity while not decreasing quality could focus on the following: using AAs to call patients to decrease no-show rates, performing other clinical duties that do not require the expertise of a doctoral-level audiologist, and limiting use of second audiologists to ages <3 yr and/or on a case-by-case basis.

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Supplemental Appendix S1

Supplemental File

Formal Training Programs for AAs

Since 2003 Nova Southeastern University has granted a certificate of completion based on successful completion of a distance learning program. For the five years from 2011 through 2015, 324 students completed the amplification module and 222 students completed the diagnostics module (personal communication, Teri Hamill 2/26/16). In addition to coursework, the audiologist's assistant works with a licensed audiologist to complete specific assignments. Approximately 20% of the students are from the VA, but the majority comes from the private practices of audiologists and otolaryngologists. There are two independent modules, with 6 months allowed for completion of each module. The student may start the modules at any time. Each module costs $325 plus $15 (in the US) for shipping/handling of course materials. NSU allows for divergence of opinion about appropriate job duties. Although students must pass the exams for all specific topics, the supervising audiologist may decline to train the AA on a specific task and credit will still be given provided the exam is passed.

The Certificate Program for Otolaryngology personnel (CPOP) issues a Certificate of Completion from the The American Academy of Otolaryngology—Head and Neck Surgery (AAO) for successful completion of the 3-phase OTOtech program (http://www.michiganear.com/webdocuments/CPOP_Announcement_for_Webpage.pdf). Each CPOP registrant must work under the supervision of an otolaryngologist who is responsible for monitoring progress and specifying the role of the tech in the office. Educational materials on hearing and vestibular anatomy, physiology and testing are provided for self-study. Following self-study and successful exam completion the student attend a 2 ½ day training workshop to learn to perform test procedures. The final phase is a 6-month period of supervision by the

otolaryngologist during which the student performs procedures which are reviewed for accuracy. If all assigned procedures are successfully completed, the log books are submitted and a "certificate of knowledge" is awarded. The $1,500 fee covers the cost of course materials and registration for the 2.5 day workshop.

The Council for Accreditation in Occupational Hearing Conservation (CAOHC) has had a certified training program since the 1970s. CAOHC certified technicians are trained to work primarily in hearing conservation programs. Certified technicians complete a CAOHC-approved, 20-hour certification course and pass an exam. Topic areas include hearing conservation anatomy, physiology, and diseases of the ear, hearing and the physics of sound, federal and state regulations related to occupational noise induced hearing loss, audiometer and testing environment, audiometric techniques and testing, hearing protection device fitting, counseling and training, recordkeeping and hearing conservation team. Course registration fees vary among locations and Course Directors. 2/13/16 http://www.caohc.org/about-caohc/history

The Veterans Administration (VA) uses Health Technicians (Audiology) to support Audiologists in the provision of professional services. The supervising Audiologist's scope of practice dictates the duties and responsibilities assigned to the Health Technician (Audiology). 2/13/16 http://mycareeratva.va.gov/careers/career/064006. The VA website includes the following knowledge areas: equipment set up and operation, audiology rehabilitation services and assistive technology, device orientation and training, infection control and safety procedures, clinical procedures in audiology, anatomy and physiology of the ear, procedures for maintaining records related to patients, supplies, equipment, prostheses and clinical activities, scheduling and customer service, screening and interviewing techniques, federal, VA and other regulations pertaining to the delivery of patient care in audiology.

Supplemental Appendix S1

The military has a group-paced training course for the US Air Force and Army located at Fort Sam Houston. (2/13/16 http://www.army-technology.com/projects/fortsamhoustontexas/). The description posted indicates that Otolaryngology and Audiology Technologists are trained to function under the supervision of physicians and audiologists. The course training is focused on diagnostic and interventional treatments of patients with ear, nose throat and/or hearing related conditions. "The Otolaryngology/Audiology Technology Program provides simulated and live training in all aspects of otolaryngology and/or audiology services to include invasive and non-invasive Otolaryngology procedures and diagnostic audiology services. Quality control and safety techniques are emphasized throughout the program. Lecture, demonstration, online Materials, simulations, and laboratory practice are utilized during pre-clinical training. Clinical training may occur at military or civilian treatment facilities." (p. 34)

The Hearing Care Technician Certificate is awarded by the American Institute of Continuing Medical Education upon completion of a web-based program. The initial steering committee, consisting of James Hall Ph.D., Jackie Clarke P, Richard Gans Ph.D., and Herbert Silverstein MD recognized the need to expand hearing health services in developing countries. The core curricula, which are offered in both English and Spanish, are designed to provide general knowledge and skills required by a hearing care technician who will work under the supervision and direction of a physician or audiologist. The cost is $795 for the entire curricula, examinations and certificate. Advanced and specialty curricula and certificates are offered: amplification, electrophysiology, pediatrics, vestibular, program development and administration (www.aicme.com/ihct).

Supplemental Appendix S1

The Dominican Republic worked with EARS Inc. of Australia, the Medical Ministry International and the Universidad Frederico Henriquez to develop an accepted university two-year audiology program for audiology technicians (Carkeet et al. 2014).