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Review of Au.D. Program Curriculums and the Current State of Audiology Roles and Responsibilities in the United States

Kerri L. Heesemann

The Graduate Center, City University of New York

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REVIEW OF AU.D. PROGRAM CURRICULUMS AND THE CURRENT STATE OF AUDIOLOGY ROLES AND
RESPONSIBILITIES IN THE UNITED STATES

by

KERRI-LEIGH HEESEMANN

A capstone research project submitted to the Graduate Faculty in Audiology in partial fulfillment
of the requirements for the degree of Doctor of Audiology, The City University of New York

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This manuscript has been read and accepted for the Graduate Faculty in Audiology in
satisfaction of the capstone research requirement for the degree of Doctor of Audiology, Au.D.

Date

[Barbara E. Weinstein, Ph.D.]
Faculty Advisor

Date

[Brett A. Martin, Ph.D., CCC-A]
Acting Executive Officer

THE CITY UNIVERSITY OF NEW YORK

ABSTRACT

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KERRI-LEIGH HEESEMANN

Advisor: Barbara E. Weinstein, Ph.D.

Audiology, a health profession concerned with all auditory impairments and their effect on communication, has rapidly and dramatically changed over the last 70 years of its existence (American Academy of Audiology [AAA], 2004). What began as a field dedicated to helping address veterans with hearing difficulties sustained while in the service, has now become a medical profession with a wide and varied Scope of Practice that requires an entry level a doctoral degree. With the evolution of technology, and knowledge about hearing loss, there has been an increase in the information and knowledge required for best practice. While education standards have changed as the field evolved, the education standards are merely guidelines for which the 74 accredited Au.D. programs in the United States use to shape their curriculums. Differences in curriculums lead to differences in quality of clinicians and service. This project reviews how the audiology Scope of Practice has evolved and the exposure to the areas within the scope that Au.D. students are receiving.

TABLE OF CONTENTS

Abstract.....	iv
List of Tables.....	vi
Introduction.....	1
Recommendations.....	29
References.....	34

LIST OF TABLES

Table 1: Areas of professional roles and responsibilities within the American Speech-Language-Hearing Association Scope of Practice document.....	8
Table 2: Statements of Purpose of the ASHA Scope of Practice Documents for Audiology.....	12
Table 3: Differences between the educational and clinical standards for accreditation of the CAA and the ACAE.....	18
Table 4. Frequency of Courses Offered in 72 Au.D. Programs in the United States.....	23

INTRODUCTION

Currently in the United States there are an estimated 48 million people suffering from hearing loss (Lin, Thorpe, Gordan-Salant, & Ferrucci, 2011). As our population ages and life expectancy increases the prevalence of hearing loss is on the rise. Recent research has additionally linked hearing loss to a variety of different health and quality of life issues, such as reduced cognitive function, decreased physical functioning, and poor clinician-client communication (Lin, Yaffe, Xia, et al., 2013; Chen, Genter, Betz, & Lin, 2014; Mick, Foley, & Lin, 2014). With advances in technology available for treatment of hearing loss and a focus on person centered care, audiologists are being asked tasked to fill in the void in the medical arena. It is more important now than it has ever been that Au.D. graduate programs become aware of areas that they can improve their didactic and clinical education of students so that all Au.D. graduates can provide competent, evidence-based, person-centered care to those in need of hearing health care.

As research and technology advance, so does our knowledge of the human body. While physicians of the past were expected to be experts on all parts of the body, over time, specializations were created and new professions dedicated to different parts of the body were established. Audiology, a field dedicated to helping persons with ear related disease hear better, is one such field which has grown out of a need that could not be filled by traditional physicians. What began in the mid 20th century in response to the needs of veterans with military related hearing impairments has grown into a profession requiring a doctoral level degree designator and state licensure serving individuals across the lifespan (Jerger, 2009).

Hearing testing as a rudimentary practice began in the early 20th Century with the introduction of various tuning fork tests that revealed information about the presence or absence of certain types of hearing loss. Audiology in the United States, as we know it today, grew from aural rehabilitation programs instituted by the U.S. Army and Navy in the last two years of World War II. Building upon the lip-reading training programs that serviced 108 soldiers following World War I, Raymond Carhart incorporated rudimentary hearing aids in treatment of veterans. Following World War II, the advances in the field that occurred across the country, including the discovery of speech audiometry, immittance measure, and basic rudimentary hearing aid fitting strategies came together to sow the beginnings of the profession of audiology (Jerger, 2009).

Following the advances seen in the world of hearing assessment that occurred during World War II, university programs that were dedicated to speech correction, an early form of speech pathology, began to incorporate courses on audiological testing and aural rehabilitation. In 1946, the first Ph.D. in audiology in the United States was awarded at Northwestern University (Jerger, 2009). For the first several decades of the field of audiology, entry level clinicians were required to obtain a master's degree and researchers in the field were expected to obtain a Ph.D. At that time, masters level audiologists worked primarily in a role of diagnostician as they were not certified or licensed to dispense hearing aids, however, in 1979, the American Speech Language and Hearing Association (ASHA) deemed it ethical and within the Scope of Practice for audiologists to dispense hearing aids, ushering change in the profession (Jerger, 2009).

The inclusion of hearing aid dispensing into the clinical responsibilities of an audiologist set the profession on a trajectory of autonomy which sadly we have still not achieved. The

growth in the field meant that clinicians were expected to have knowledge in more areas, which led to programs adding classes to the two-year master's programs. In 1983, ASHA completed a study which concluded that the traditional two-year master's degree was not sufficient to fully prepare audiologists for clinical practice given the broadening scope of practice ("Au.D. Timeline", 2009). Ultimately, despite years of discussion on the issue, audiology training transitioned to a doctoral level, with its own degree designator known as the Au.D. In 1992, the first Au.D. students matriculated at Baylor College in Houston, Texas and by 2006, the majority of audiology graduate programs had transitioned from the master's level and were graduating students with the professional doctorate Au.D. (Jerger, 2009; "Au.D. Timeline", 2009).

The definition of an audiologist varies slightly across professional organizations. ASHA (2018) noted that an audiologist is a person who engages in "professional practice in the areas of hearing and balance assessment, nonmedical treatment and (re) habilitation" (p. 1). The American Academy of Audiology (AAA) (2004) defines an audiologist as one who is "uniquely qualified to provide a comprehensive array of professional services related to the prevention of hearing loss and the audiological identification, assessment, diagnosis, and treatment of persons with impairment of auditory and vestibular function, and to the prevention of impairments associated with them" (para. 5) . The Academy of Doctors of Audiology (ADA) (2003) separately defines an audiologist as one who is "uniquely qualified to provide a comprehensive array of professional services related to the identification, diagnosis and treatment of persons with auditory and balance disorders, and the prevention of these impairments" (para. 2).

The differences in the definition of an audiologist is reflected in the mission and focus of each of the professional organizations focused on improving the lives of persons with hearing loss. For example, the Academy of Rehabilitative Audiology (ARA) lists its mission the goal of

promoting excellence in hearing care through the provision of rehabilitative and habilitative services (Academy of Rehabilitative Audiology, 2017).

There are three large professional organizations for audiologists in the United States which that share similar mission and goals, but professional membership differs according to the focus of each. The organizations were each created at different times during the evolution of the field, and examining the history and mission of these groups illuminates how the profession has evolved. ASHA, created in 1925 as an organization for speech correctors, incorporated hearing specialists as the field of audiology began to develop (Jerger, 2009). Currently, ASHA lists as it's mission “empowering and supporting audiologists, speech-language pathologists, and speech, language, and hearing scientists through advancing science, setting standards, fostering excellence in professional practice, and advocating for members and those they serve” (“ASHA’s Strategic Plan: Strategic Pathway to Excellence, n.d., para. 2). Interestingly, ASHA is the only organization that includes in its mission the creation of standards for professional practice. The standards that they have promulgated have in fact been integral to the creation of the profession and its educational programs.

In 1977, the ADA was created by a group of audiologists who were specifically interested in hearing aid dispensing and from its inception the organization has been focused on professional autonomy (Jerger, 2009). The ADA lists its official mission as the “advancement of practitioner excellence, high ethical standards, professional autonomy and sound business practices in the provision of quality audiological care” (ADA, 2018, para. 4). Overall the ADA, currently known as the Academy of Doctors of Audiology, focuses more heavily on business aspects of audiology, as compared to other professional organizations.

In 1988, AAA was founded with the goal of creating an organization whose membership would be comprised entirely of audiologists. The organization quickly gained popularity and currently has an active membership of more than 12,000 hearing health care professionals. Its mission is to “promote quality hearing and balance care by advancing the profession of audiology through leadership, advocacy, education, public awareness, and support of research” (AAA, 2018, para. 2) .

All three organizations offer audiologists unique opportunities and information to broaden the depth of their knowledge to keep pace with changes in the marketplace. While the groups all represent audiologists or hearing health care professionals, slight differences in official definitions of the profession and in scope of practice documents have been noted. These national organizations, each created to fill a hole felt by professionals, are one example of the variability within the field of audiology.

ASHA, AAA, and ADA maintain separate Scopes of Practice that outline the knowledge and skills that audiologists in the United States should possess. The scopes evolve as research and best practices change with time, although revisions do not occur at a rate that accurately mirrors the growth of the field. ASHA recently updated its Scope of Practice in 2018, before which time the scope had last been revamped in 2004 (ASHA, 2018). The last revisions of the AAA scope and the ADA documents occurred in 2004 and 2003, respectively (AAA, 2004; ADA, 2003). Long time periods between revisions of scope of practice documents allow time for the field to grow, however, too lengthy of a time period may lead to discrepancies in audiology practices. If audiologists are not aware of the new knowledge that they should be acquiring, there is possibility that quality of care and service will be affected.

The ASHA (2018) scope, most recently revised, provides an opportunity to analyze the evolution of the profession through the guiding document of the organization that is responsible for the accreditation of most audiology graduate programs and the licensing of many audiologists. The original document, published in 1990, outlined the roles of audiologists and speech-language pathologists within the same document. The responsibilities of an audiologist, seen in Table 1, were described in six succinct clauses. The roles included “conservation of the auditory system function”, diagnostics of peripheral and central auditory dysfunctions, electrophysiological and behavioral evaluations of the auditory and vestibular systems, selecting, fitting, dispensing of amplification and assistive listening devices, providing aural rehabilitation, and screening for other factors affecting communication (ASHA, 1990, p. 2).

In 1996, ASHA updated the practice guidelines and separated the scopes of audiology from that of speech-language pathology. The areas of practice expanded to 23 clauses, the first of which specified “activities that identify, assess, diagnose, and interpret results related to...hearing, balance, and other neural systems” (ASHA, 1996, p. 3). This shift illustrates growth in the field and the shift of the profession from one created to help with conservation of hearing toward a more diagnostic field. The new scope included newborn hearing screening programs, intraoperative monitoring, cochlear implants, educational and pediatric audiology responsibilities, functional and efficacy evaluations, and counseling.

The 1996 Scope of Practice also included outcomes of audiology services, which were meant to be “measured to determine treatment effectiveness, efficiency, cost-benefit, and consumer satisfaction” (ASHA, 1996, p.4). This addition signals the further evolution of audiology as a field full of independent practitioners. The outcomes state a variety of different services that audiologists should provide, from general concepts such as counseling to the more

specific, “interpretation of otoscopic examination” (ASHA, 1996, p. 4). Audiologists were now expected to have all the skills needed to diagnose and treat persons with hearing loss independently.

Additionally, this scope introduced the conceptual framework of ASHA Standards and Policies. The diagram included within the document was meant to depict the relationship between the scope of practice and other policy documents being published by ASHA. This framework noted the scope of practice document as the most general document dictating audiology practices. Preferred practice patterns, position statements, and practice guidelines all worked to refine the roles and responsibilities of an audiologist (ASHA, 1996). This framework was updated in the 2004 scope to include knowledge and skill statements as the final refining factor dictating practices.

ASHA (2004) included a large amount of information about the World Health Organization (WHO)’s International Classification of Functioning (ICF) system which served as the basis of the scope. This classification system made an important distinction between one’s body functions and structures, their activity and participation, and contextual factors that may impact patients. The ASHA document specifically noted the importance of interviewing patients with the goal of discovering how their hearing loss affects their lives in functional ways. The inclusion of this system was meant to guide audiologists toward more patient-centered assessment and treatments (ASHA, 2004). The 2018 scope document updated the information about the ICF to reflect the WHO’s update to the system. The updated version notes that, according to the ICF, audiologists are obligated to develop functional goals and collaborative practice (ASHA, 2018).

Updates to the 2004 Scope of Practice included a restructuring of the professional roles and activities of audiologists. The areas of the Scope of Practice were separated into six broad areas which included prevention, identification, assessment rehabilitation, advocacy/consultation, and education/research/administration. Within these broad areas, forty clauses specifying the roles of audiologists were included.

Table 1. Areas of Professional Roles and Responsibilities within the American Speech-Language and Hearing Association Scope of Practice Document

	Roles and Responsibilities within the Audiology Scope of Practice
1990 Scope of Practice	<ul style="list-style-type: none"> • Conservation of the auditory system • Screening, identifying, assessing and interpreting, diagnosing, preventing, and rehabilitating peripheral and central auditory system dysfunctions • Measures of behavioral and electrophysiological measures of auditory and vestibular functions • Selecting, fitting, and dispensing of amplification, assistive listening and alerting devices • Aural rehabilitation and counseling • Screening of speech-language and other factor affecting communication function
1996 Scope of Practice	<ul style="list-style-type: none"> • Otoscopy, cerumen management, ear mold impressions • Central Auditory processing disorders • Supervision and conduct of newborn hearing screening programs • Intraoperative monitoring • Cochlear implant assessment • Educational consultation/classroom acoustics and FM systems • Vestibular rehabilitation • Research • Education in audiology • Functional outcomes, consumer satisfaction, effectiveness, and efficacy measures • Supervision of personnel • Accessibility consultation • Tinnitus management • Case management
2004 Scope of Practice	<ul style="list-style-type: none"> • Prevention • Identification • Assessment

	<ul style="list-style-type: none"> • Rehabilitation • Advocacy/Consultation • Education/Research/Administration
2018 Scope of Practice	<ul style="list-style-type: none"> • Diagnostics for Hearing, Balance, and Other Related Disorders • Treatment for Hearing, Balance, and Other Related Disorders • Early Hearing Detection and Intervention (EHDI) • Educational Audiology • Hearing Conservation and Preservation • Telehealth • Counseling • Research • Administration and Leadership • Education • Advocacy and Outreach • Cultural Competency • Clinical Supervision/Precepting • Interprofessional Education and Interprofessional Practice (IPE/IPP) • Business Management • Legal/Professional Consulting

In addition to the notable areas of the scope that were part of every document, ASHA has always specified that the document is a guideline and the experiences of the individual are the final indicator that dictate the services and role that a clinician can provide. In the original 1990 document, it was stated that “levels of experience, skill, and proficiency with respect to the activities identified within the scope of practice will vary among the individual providers” (ASHA, 1990, p.1).

Despite the attempt to define the “areas of professional practice” for audiologists within the United States, ASHA has, from the document’s inception, included a statement that would allow for growth within the field. Each scope notes that the document is not exhaustive and “practice activities related to emerging clinical, technological, and scientific developments are

not precluded from consideration as part of the scope of practice” (ASHA, 2018, p. 5). This clause provides an important function, as it allows for the field to grow without the scope of practice document being revised. While this covers any advances that may happen in the field and theoretically allows for new areas to be included, it is also important that the document be updated.

The 2018 revision of the ASHA guidelines led to the inclusion of new diagnostic and rehabilitative techniques and technology within the scope of audiology. In previous Scopes of Practice, the roles and responsibilities of audiologists were listed and specified. In the 2018 scope, however, the descriptions of audiologist’s roles were more general. For example, only three points were listed for the diagnostic role of audiologists, while in the past the Scope of Practices heavily focused on the diagnostic aspect of the field.

ASHA (2018) also included more detailed lists regarding treatment options for persons with hearing, loss, tinnitus or balance disorders. Intervention options were expanded to include self advocacy, strategies to address tinnitus, and technology interventions. Additionally, auditory brainstem implants, classroom audio distribution systems, hearing protection, custom ear impressions, middle ear implants, over-the-counter (OTC) hearing aids, personal sound amplifying devices, osseous integrated devices, remote microphone systems, and tinnitus devices were added to the list of treatment technologies within the scope of practice of audiologists.

The 2018 scope expanded descriptions of the roles of professionals in specific areas of the scope. The Early Hearing Detection and Intervention (EDHI) program was provided a dedicated section within the scope. The roles of audiologists in the assessment, diagnosis, treatment, and counseling of infants and their families was outlined. Educational audiology was thoroughly detailed, and audiologists were listed with the professional responsibility to assess

children’s hearing, promote self-advocacy, monitor classroom acoustics, and monitor hearing instruments, among other things. Hearing conservation and preservation were also delineated and the roles of audiologists within each of these areas was described (ASHA, 2018).

Among the many areas of the audiology Scope of Practice document that were updated in 2018, two changes to the document reflect the changes within the field as a whole. One such change was the inclusion of telehealth as an essential means of service delivery. By using telehealth audiologists aim to provide assessment and treatment services to persons who are not physically able or willing to travel to an audiologist’s office. While still new, this technology can help those patients who live in remote areas or are unable to leave their homes.

Counseling was also elaborated on within the roles and responsibilities of audiologists. The 2004 Scope of Practice mentioned counseling saying that within the area of rehabilitation, audiologists should provide “counseling relating to psychosocial aspects of hearing loss” (ASHA, 2004, p. 6). The 2018 scope document, however, includes counseling as a stand-alone role noting that audiologists should provide “information, education, guidance, and support to individuals and their families” (ASHA, 2018, p. 10). Counseling, according to ASHA, includes discussion of results and treatment options and interactions related to the psychology of living with a hearing disorder (ASHA, 2018).

The expansion of this area, specifically, aligns with other additions to the scope that focus on patient-centered and individualized care and signals how the profession is evolving. In the overview of audiologist’s assessment responsibilities, it is specifically noted that testing should be “modified based on patient age and on cognitive and physical abilities” of the patient. Audiologists are also tasked with providing treatment options informed by “individual preference and values” (ASHA, 2018, p. 5). Interprofessional collaboration in the delivery of

care was additionally expanded on in the 2018 scope document due to the fact that its implementation, according to ASHA can increase the level of patient-centered care (ASHA, 2018).

Interestingly, the statement of purpose for the document was also expanded in the 2018 document. In Table 2, the statements of purpose for the ASHA Scope of Practice across the years are outlined. The statement of purpose had not changed in the 2004 document, however in 2018 it included a mention of the support audiologists in the provision of high-quality, evidence-based services and for professionals working at the top of their license, and support for new research. It additionally mentioned the scope of practice could also be used as a guide for education and professional development of audiologists, which suggests that graduate programs should use the scope of practice to inform their curriculums (ASHA, 2018).

Table 2: Statements of Purpose of the ASHA Scope of Practice Documents for Audiology

Year	Scope
1990	<ul style="list-style-type: none"> • Inform members of ASHA and certificate holders of the activities for which certification in the appropriate area is required in accordance with the ASHA Code of Ethics • Educate health care and education professionals, consumers, and members of the general public of the services offered by speech-language pathologists and audiologists as qualified providers
1996	<ul style="list-style-type: none"> • Describe the services offered by qualified audiologists as primary service providers, case managers, and/or members of multidisciplinary and interdisciplinary teams • Serve as a reference for health care, education, and other professionals, and for consumers, members of the general public and policy makers concerned with legislation, regulation, licensure, and third party reimbursement • Inform members of ASHA, certificate holders, and students of the activities for which certification in audiology is required

	in accordance with the ASHA Code of Ethics
2004	<ul style="list-style-type: none"> • Describe the services offered by qualified audiologists as primary service providers, case managers, and/or members of multidisciplinary and interdisciplinary teams • Serve as a reference for health care, education, and other professionals, and for consumers, members of the general public and policy makers concerned with legislation, regulation, licensure, and third party reimbursement • Inform members of ASHA, certificate holders, and students of the activities for which certification in audiology is required in accordance with the ASHA Code of Ethics
2018	<ul style="list-style-type: none"> • Delineate areas of professional practice • Inform others (e.g., health care providers, educators, consumers, payers, regulators, and the general public) about professional roles and responsibilities of qualified providers. • Support audiologists in the provision of high-quality, evidence-based services to individuals with hearing and balance concerns. • Support audiologists working at the top of their license. • Support audiologists in the conduct and dissemination of research. • Guide the educational preparation and professional development of audiologists to provide safe and effective services. • Inform members of ASHA, certificate holders, and students of the activities for which certification in audiology is required in accordance with the ASHA Code of Ethics (ASHA, 2016). Each practitioner evaluates his or her own experiences with pre-service education, practice, mentorship and supervision, and continuing professional development. As a whole, these experiences define the scope of competence for each individual. Audiologists should engage in only those aspects of the profession that are within her or his professional competence. ASHA members and ASHA-certified professionals are bound by the ASHA Code of Ethics (ASHA, 2016) to provide services that are consistent with the scope of their competence, education, and experience.

Scope of Practice documents for audiologists have been published by other professional organizations aside from ASHA. AAA, which maintains a membership of over 12,000 hearing

health care providers, last revised its Scope of Practice in 2004. This scope lists identification, assessment and diagnosis, treatment, hearing conservation, intraoperative neurophysiologic monitoring, and research within the scope of practice (AAA, 2004). Updates to Scope of Practice documents are important while they serve to provide a guideline for professional services, as shown above, changes can illuminate how the overall profession is changing.

Scope of Practice documents serve to “delineate areas of professional practice” but also aim to support professionals in the “provision of high-quality, evidence-based services”, otherwise known as best practices (ASHA, 2018, p.4). These practices, also listed as clinical practice guidelines in research, are meant to minimize practice variability and error rates (Haines & Jones, 1994). In 2017, ASHA published a list of ten audiology best practices, including developing a comprehensive patient-centered treatment plan, using well-validated needs assessments, administering meaningful evaluations, such as speech in noise testing, selecting hearing aids based on treatment goals rather than an audiogram, verifying hearing aids, validating treatment plans, prescribing hearing assistive technology as appropriate, itemizing fees, and providing aural rehabilitative services. The ASHA Scope of Practice (2018) noted that audiologists must “design, implement, and document delivery of service in accordance with best available practice” (p. 7).

Boisvert et al. (2016) surveyed 96 practicing Australian audiologists at the World Congress of Audiology to assess the importance of different factors during an appointment which impact clinical decision making. On average, audiologists ranked audiometric results as the most important source for decision making. Practice guidelines, on average, were considered 4th important, behind clinical experience, and client opinion. An ASHA (2016) survey of 1, 569 ASHA certified audiologists, revealed that 79% of dispensing audiologists perform verification

of hearing aids, 94% perform informational counseling, 35% validate treatment outcomes using self-report questionnaires, 32% validate using speech-in-noise testing, and 9% fit and dispense personal sound amplification products. Another national study by Mueller & Picou (2010) of 258 audiologists revealed that verification using real ear measurements, for verification of hearing aids, was only used by 45% of audiologists during hearing aid fittings. The limited number of clinicians who use validation assessments or who fit PSAPs leads one to believe that best practice standards or position statements are not adequately guiding audiologists to provide those services.

Adherence to best practices is becoming all the more important as the profession grows. According to the Bureau of Labor Statistics (2018), in 2017 there were 12,020 audiologists working in the United States with an expected increase in employment of 21%, a much faster rate, on average, than many other health related professions. This increase in number of audiologists is related to the education of new audiologists. The 2016-2017 academic year Communication Sciences and Disorders Education Survey (2018) collected responses from 93% (n=70) of entry-level clinical doctorate programs in audiology and revealed that 689 Au.D. degrees were granted in 2017. This number was extrapolated from 100% of programs to a total graduation number of 738 in 2017, which increased from 502 in 2009 (Council of Academic Programs in Communication Sciences and Disorders [CAPCSD] & ASHA, 2018). With the field so rapidly expanding, the Scope of Practice guidelines and the clinical practice procedures will become all the more important to keep services on the same level of excellence.

When audiologists first began conceptualizing the Au.D. degree designator, they envisioned educational programs that would provide more didactic and clinical education than past programs. Master's programs in audiology required only two years of study plus a nine-

month clinical fellowship year (CFY), which was considered a transition period after completion of course work that bridged being a student and being an independent provider of clinical services (Goldstein, 1992; “Speech Pathology Clinical Fellowship”, n.d.). Au.D. programs increased course work to four years to accommodate the expansion of areas within the scope. They replaced the CFY year with a one year residency as part of the curriculum recommended by the Council on Academic Accreditation (CAA) such that all clinical experience would occur before the student graduated and thus would be supervised through the audiology program. The inclusion of this one-year residency theoretically allowed for more oversight of the clinical experiences of students (Ramachandran, 2011).

After conceptualizing the Au.D., it took several years for the education requirements for the degree to be standardized. Leaders in the field wanted to ensure that all new Au.D. audiologists were prepared for the clinical practice of audiology, no matter their location or site of matriculation. To accomplish this, two accreditation bodies, the Council on Academic Accreditation in Audiology and Speech-Language Pathology (CAA) through ASHA and the Accreditation Commission for Audiology Education (ACAE), were created (CAA, 2019; ACAE, n.d.). Essentially serving the same role, these commissions outline the required aspects of program governance, curriculum, assessment, and clinical education of Au.D. programs in the United States. By standardizing curriculums with general guidelines, the field of audiology would maintain professional cohesion. Additionally, it helped ensure that all new Au.D. graduates were meeting the same level of excellency and competency that was expected from a clinical doctorate degree. With the accreditation standards in place, all newly graduated Au.D. audiologists would be fully prepared, theoretically and clinically, to practice and serve patients within the full national scope of practice ((CAA, 2019; ACAE,n.d.).

Both commissions present similar guidelines, based on the growing scope of practice and relevant research and literature in the field. As the field changed, these standards were to be revised, reflecting the need for audiologists and graduate programs to broaden their knowledge base. The most recent revision of standards occurred in 2017 and 2016 for the CAA and the ACAE, respectively. The updates involved the inclusion of many new topics that graduate programs were required to address in their curriculum, such as genetics, pharmacology, business management, active listening, and infection control (ACAE, 2016; CAA, 2018).

Both the CAA and the ACAE separate the requirements for Au.D. curriculums into different general course topics and then more specific subunits that should be covered. The CAA standards require coursework to be separated into 6 areas: professional practice competences, foundations of audiology practice, identification and prevention of hearing loss, tinnitus, and vestibular disorders, assessment of the structure and function of the auditory and vestibular systems, assessment of the impact of changes in the structure and function of the auditory and vestibular systems, and intervention to minimize the effects of changes in the auditory and vestibular systems on an individual's ability to participate in his or her environment (CAA, 2017). Comparatively, the ACAE requires courses addressing foundations, diagnosis and management, communication, and professional responsibilities and values (ACAE, 2016).

When directly compared, CAA standards appear to be more structured and detailed than ACAE standards yet the former are more widely adopted. CAA standards break down the scope into much smaller units. For example, one assessment competency is specifically listed as otoscopic examination, while performing otoscopy is not mentioned specifically within the ACAE guidelines (CAA, 2017; ACAE, 2016). The inclusion of more details lends itself to more specific practices being listed within the CAA guidelines. Screening of hearing, speech, and

functional needs were all separately noted in the CAA document. Screening for speech language disorders, an appropriate role for audiologists as they assess communication abilities of children and adults with neurological conditions, is not mentioned in the ACAE guidelines. Additionally, patient outcome measures are not mentioned at any point in the ACAE document, but are specifically listed as a knowledge area that must be included in CAA accredited programs (CAA, 2017; ACAE, 2016).

Regarding clinical experiences, CAA guidelines require a clinical component to education that is planned for each student and which ensures that all populations, age groups, and clinical settings are experienced (CAA, 2017). ACAE guidelines similarly require a diverse population and clinical setting experience with a “level of quality that allows students to develop skills necessary to provide the full scope of practice” (ACAE, 2016, p.9). As with the didactic requirements, the CAA document provides much more guidance for Au.D. programs, including a framework for the relationship between clinical placement and university, a list of areas that students should be exposed to, and requirements for documentation of the clinical experience (CAA, 2017).

Table 3: Differences Between the Educational and Clinical Standards for Accreditation of the CAA and the ACAE

<i>CAA</i>	<i>ACAE</i>
Didactic	Didactic
<ul style="list-style-type: none"> • Professional Practice Competencies (9 competencies) • Foundations of Audiology Practice (17 competencies) • Identification and prevention of hearing loss, tinnitus, and vestibular disorders 	<ul style="list-style-type: none"> • Foundations (12 competencies) • Diagnosis and Management (14 competencies) • Communication (8 competencies) • Professional Responsibilities and

<p>(9 competencies)</p> <ul style="list-style-type: none"> • Assessment of the structure and function of the auditory and vestibular systems (20 competencies) • Assessment of the impact of changes in the structure and function of the auditory vestibular systems (5 competencies) • Intervention to minimize the effects of changes in the auditory and vestibular systems on an individual’s ability to participate in his or her environment (19 competencies) 	<p>Values (17 competencies)</p>
<p style="text-align: center;">Clinical</p> <ul style="list-style-type: none"> • “Planned for each student so that there is access to a base of individuals who may be served that is sufficient to achieve the programs stated mission and goals. That base includes a variety of clinical settings, populations, and age groups. Must include direct contact with individuals seeking services, consultation, recordkeeping, and administrative duties” • “Ensure that clinical education is provided in a manner that supports student development so that each student is prepared to enter independent professional practice” • “Clinical education in external placements is governed by agreements between the program and the external facility and is monitored by program faculty.” 	<p style="text-align: center;">Clinical</p> <ul style="list-style-type: none"> • The program must demonstrate that students receive quality instruction in multiple clinical environments whose populations represent the scope of audiology across the lifespan. • The program must assure that the clinical experiences that students engage in lead to the independent practice of audiology. • Clinical Instructors must be available when students are being educated in clinical settings and provide assurance that the student education is in accordance with the program curriculum and all federal and state regulations. Clinical instructors must provide supervision at a level that is appropriate for student learning and patient care needs. • The program must have a current written and mutual agreement(s) with each clinical instructor, clinical site or institution that describes the legal relationship between the program and

	<p>clinical site, as well as the expected student learning outcomes, the expectations for the quality of the student experience, the responsibilities of the student, the role of the clinical instructor(s), methods of communicating regularly between the program and site, process for evaluation of the student and preceptor and/or clinical site, and process for addressing grievances.</p>
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While the accreditation commission reviews each program periodically to ensure that they are meeting the high quality of education standards that they put forward, the guidelines also require programs include self-enforced outcome measures. The ACAE demands that every program have a system in place that assesses if goals and objectives are being met. The framework that it lists for this system, in Standard 18, notes that goals should be reviewed and the results of these reviews should be documented. One way that the program’s efficacy should be evaluated is through assessment of its students, but the commission suggested that many different aspects of the program should be used to assess its quality, including feedback from students, clinical experiences, internal and external reviews (ACAE, 2016).

On the surface, CAA guidelines for program assessment are more detailed. The standards require regular formative student assessments that help provide feedback to students about performance. Programs are also expected to perform assessments of the quality and effectiveness of the policies, procedures, and curriculum. The CAA also requires universities to post certain statistics on the program website, including graduation rates, Praxis success, and successful employment of graduates (CAA, 2017).

Every Au.D. program in the United States, regardless of accreditation, has a responsibility, as listed in the ACAE standards, to “graduate generalists with broad exposure and competence in the delivery of hearing and balance services” (ACAE, 2016, p. 3). As shown in Table 4, this broad range of exposure requires a varied and comprehensive curriculum, as well as diverse practical experiences. As stated by both accreditation bodies, students must have exposure to many different areas within the Scope of Practice and to many different types of patient populations (CAA, 2017; ACAE, 2016). Stated plainly, if a student is only given the opportunity to work practically with fitting children with hearing aids before taking a class on the topic, their university failed in succeeding to train a well-rounded and knowledgeable clinical audiologist.

According to the ADA (2018) 75 universities currently offer doctoral degrees in Audiology in the United States. Of these 75 Au.D. programs, 99% (n=74) have CAA accreditation, 5% (n=4) hold dual CAA and ACAE accreditation, and one program holds only ACAE accreditation (“Au.D. Programs”, 2018). The majority of programs are four years but increasingly programs are shifting to three years, Northwestern University being the first. The comprehensive and exhaustive list of requirements expected to be met by all Au.D. programs in the United States exist to ensure that the same educational and clinical standards are used to train future audiologists. The variety of populations, cultures, patients, and needs of individuals across the country vary, but patients and other professionals have to trust that audiology services will not differ in quality based on the education of the clinician. The framework for education and clinical experience, if appropriately administered, should produce entry level clinicians of equal quality.

Formal research into differences within Au.D. curriculums has been limited. Wilson & Seal (2015) surveyed graduate program directors to investigate how programs are educating their students about specific topics. Wilson & Seal (2015) examined the growing delivery model of telepractice, which allows clinicians to provide remote treatment and assessment of their patients. When surveyed, 54% of Au.D. Directors who responded to the survey indicated that they did not provide telepractice as a topic within their curriculum, while the remaining respondents indicated their telepractice education was offered in a variety of forms.

Arnos et al. (2004) surveyed 56% of Au.D. programs and found that 95% of respondents noted genetics content in their didactic curriculums. The way that genetics was taught, however, varied extensively among programs, from total classroom hours ranging from 2 to 65. While most programs noted education on basic genetics, syndromes, and interpreting family history, a smaller number of curriculums included education about genetic testing, ethical or legal issues, or the molecular bases of genetics.

Callahan et al. (2013) reviewed CAA accredited Au.D. programs to obtain information about coursework and clinical experience related to vestibular evaluation. Results revealed programs offered courses ranging from zero to eight credit hours. Additionally, only 34.5% of instructors surveyed reported that their programs prepared students very well to manage vestibular patients, indicating weaknesses in regards to evaluations like rotary chair and otolith function testing.

Sykes, Tucker, & Herr (1997) surveyed students in Master level audiology graduate programs and found that the level of didactic and clinical exposure to which every student was exposed varied widely. This study, although dated, illustrates how programs vary in their

outlook on the importance of different areas of the scope of audiology. The importance that programs placed on aural rehabilitation was rated by faculty members and ranged from 7% to 60%. The study also revealed that 75% of programs dispensed hearing aids, 50% of programs offered ENG testing, and also 90% of programs offered CAPD testing. While this study does not directly describe current Au.D. programs, it highlights a trend for variability in the experiences and education of audiologists in the United States.

English and Vargo (2005) found that 40% of Au.D. curricula did not require a dedicated course in educational audiology. Further review of the educational audiology course offerings revealed that course objectives discussed varied in that some classes did not discuss room acoustics of a classroom. English and Weist (2005) reported that only 71% of Au.D. programs required a counseling course.

To gain insight into current practice at universities across the country, I reviewed course offerings across 74 CAA accredited Au.D. graduate programs in the United States. The curricula, sample course of study, or list of courses for the Au.D. program of every program, with the exception of two programs that are no longer accepting new students, were found on the institutional websites. Courses were separated and analyzed based on their titles or brief descriptions that were associated with the course listing. An analysis of the type and frequency of course offered in these Au.D. programs was performed.

Table 4. Frequency of Courses Offered in 72 Au.D. Programs in the United States

<i>Course</i>	<i># of programs</i>	<i>Course</i>	<i># of programs</i>
Amplification	72	Hearing Science	27
Research	72	Hearing Loss Effects	23
Pediatrics	72	Pharmacology	23

Cochlear Implants	69	Aging and Hearing	22
Hearing Conservation/Preservation	68	Tinnitus/Hyperacusis	21
Vestibular	67	Speech Pathology/Speech Science	20
Assessment	67	Genetics	20
Aural Rehabilitation	63	Ethics	12
Acoustics/Pschoacoustics/Instrumentation	59	Manual Communication	11
Evoked Potentials	59	Precepting/Supervising	10
Anatomy and Physiology	58	Multicultural	8
Business	55	OAEs/Immittance	8
Counseling	52	Intraoperative Monitoring	6
Pathologies/Disorders	42	Cerumen Management	1
Central Auditory Processing Disorders	42	Forensic Audiology	1
Educational	29	Audiology and Musicians	1
Neurology	28	Animal Audiology	1

Table 4 lists the frequency with which classes in these CAA accredited Au.D. programs are offered. The courses explicitly offered at every Au.D. granting institution included amplification courses, pediatric audiology courses, and research courses. The majority of institutions (greater than half) offered courses for vestibular assessment and treatment, cochlear implants, acoustics and psychoacoustics, general audiological assessment, evoked potentials, counseling, aural rehabilitation, business, and hearing conservation and preservation. Less frequently provided courses included specialties of audiology, such as cerumen management, manual communication, tinnitus, forensic audiology, animal audiology, and precepting/supervising, and multicultural issues.

Didactic courses regarding assessment of disorders of the auditory and vestibular systems were provided at most universities. Audiological assessment was explicitly provided in courses at 67 universities, however, the five schools that did not provide specific assessment-based courses had opportunities for practical exposure to testing and early clinical rotations where it is possible that clinical audiometry skills were taught. Eight Au.D. programs deemed it necessary to provide courses specifically to educate their students about immittance measures and

otoacoustic emissions. More common, was a course dedicated to evoked or electrophysiological potentials, which was offered at 59 universities. Courses specializing in vestibular assessment and/or treatment were found at 67 universities.

Courses teaching the fundamentals of audiology and hearing were varied in their prevalence. 58 programs offered anatomy and physiology, however, 28 offered courses dedicated to neurology or the neural bases of hearing. Hearing Science courses were offered at 27 universities, while 59 programs offered courses in acoustics, psychoacoustics, and instrumentation.

Treatment options were widely represented within Au.D. curriculums. Amplification courses were provided at all 72 universities reviewed. “Amplification” was used by some courses as a general term and it can be posited that many different amplification options were discussed within the courses. Some universities specified that the topic of their amplification courses, indicating if the syllabus focused on hearing aids, assistive devices, or cochlear implants. In general, cochlear implants were specified most commonly, with 69 programs providing courses dedicated to that form of treatment. Two universities provided an additional course in assistive listening devices.

Treatment options, however, go beyond amplification devices. Aural rehabilitation options and counseling are integral parts of patient centered service in the hearing healthcare industry. Aural rehabilitation was a foundation of the field audiology and has evolved through the years. The area, which first involved hearing aids, counseling, speechreading and auditory training has now grown to include treatments for the psychosocial aspects of hearing loss. Self-assessment measures, family intervention, and vocational assessment (Montano, 2013). ASHA (2006) defined audiological rehabilitation as a process that addressed the “impairments, activity

limitations, participation restrictions, and possible environmental and personal factors that may affect the communication, functional health, and well-being” of hearing impaired individuals (Section 15). Montano (2013) proposed a model of patient centered aural rehabilitation that included the patient story, self-assessment, communication strategies, technology, auditory/visual training, verification, consumer support, and counseling.

Despite the importance of aural rehabilitation throughout the history of audiology and the range of all it encompasses, 63 current Au.D. programs (88%) offer courses specializing in aural rehabilitation. Some schools combined aural rehabilitation with other topics such as tinnitus, general auditory management, and geriatric audiology, while others dedicated several classes specifically for aural rehabilitation. Courses specific to counseling were only provided at 52 universities (72%). Four schools offered a class in the psychosocial aspects of hearing loss and two offered a course in the psychology of the deaf and speech handicapped. While a majority of Au.D. programs offer courses in aural rehabilitation and counseling, the broad nature of the subject may lend itself to a need for multiple courses on the topic within a curriculum.

Review of the Au.D. curricula additionally revealed niche areas of audiology that are being addressed at some universities. Animal audiology, audiology and musicians, forensic and anthropological audiology, and cerumen management courses were each offered by only one university. Other subsets of audiology that were focused on in some curriculums were educational audiology (29 programs), central auditory processing disorders (42), geriatrics (22), tinnitus/hyperacusis (21) and intraoperative monitoring (6).

One topic not widely represented within the curricula was multicultural or cross-cultural competency. Eight universities (11%) offered courses related to cultural competency. Noted in the ASHA (2018) Scope of Practice as an ancillary professional area, cultural and linguistic

competencies were noted as a necessary skill when providing patient-centered care for individuals of all backgrounds. As patient-centered care moves to the foreground of the profession, it is important that our clinicians are equipped with the knowledge to provide the best care possible. In the area of cultural competency though, recent research suggests that clinicians have not been adequately trained. A 2017 ASHA survey of clinical audiologists revealed that only 37% deemed themselves qualified or very qualified to address cultural and linguistic influences on service delivery and outcomes. Audiology, and the patients it serves, is lacking in education in this growing aspect of the field.

CAA guidelines do not require specific courses to be taught in Au.D. programs. Instead, they provide topics that must be covered within the curriculum of the programs (CAA, 2018). The flexibility that universities have when making Au.D. curriculums is clearly illuminated by the results of this review. While the anatomy and physiology of the auditory and vestibular systems is a required topic for Au.D. programs, some programs choose to add it to their didactic courses dedicated to anatomy and physiology, while others incorporate it into a generalized neurology class. Similarly, some universities find it necessary to teach immittance measures within the confines of its own course, while others include it within general assessment classes or practicums.

The review of these curricula is limited by the lack of information gleaned from course names. Many universities provided professional issues courses or special topic courses that were often described briefly in the curriculums as class time used to discuss emerging trends in Audiology. There is no way that this surface evaluation of the curriculums would be able to obtain information about the topics discussed in these courses. Future research, however, could

explore class descriptions to further analyze the topics that are being discussed in every course offering.

The review of the curricula provided excellent information regarding areas of the scope of practice and current education of Au.D.s that can be improved to affect all audiology programs. Looking toward the future of audiology, the Scope of Practice document should guide the changes audiology education should implement. Included in the 2018 ASHA Scope of Practice was a definition for interprofessional collaborative practice (IPP). IPP was coined by the World Health Organization as a term used to describe treatment plans that combines information about the patient's functioning, social community, and goals with medical information from various providers to determine a course of treatment. IPP requires communication with other professionals and the patient and loved ones. Some universities offer courses, like interprofessional within their curriculum, such as interdisciplinary evaluation team, that would prepare their audiologists for such collaboration. A review of the new Scope of Practice points to the inclusion of increased collaborative and patient-centered care (ASHA, 2018).

Review of the curricula, however, points to a different trend. As seen in Table 4 most universities provide more courses dedicated to diagnostics, auditory evoked potentials, and amplification, while courses dedicated to patient centered areas of the scope, such as aural rehabilitation and counseling, given less emphasis. This trend suggests that new entry level Au.D.s are prepared for diagnostics, but are less so prepared to provide individualized treatments.

A look at the additions to the 2018 ASHA Scope also reveals the inclusion of topics such as telehealth and more emphasis on non-traditional assistive technologies, such as over-the-

counter amplification products and PSAPs. The course outlines, however, suggest that as little as 6% (n=4) of universities are offering courses dedicated to these assistive technologies.

While the accreditation standards are regularly revised to reflect changes within the field of audiology, past revisions have come after years of advances within the field. While universities should, and must, use the CAA standards to help guide their curriculum, the updated Scope of Practice may provide valuable information about the direction and the history of audiology. As expressed above, recent revisions suggest a movement toward more patient-centered care, interprofessional communication, and rehabilitative services. While it is important and integral to an audiologist's certification and licensure to be able to perform diagnostics, the profession has grown in its scope and students should be adequately prepared to provide these expanded areas, however, this will only happen if changes to the curriculum occur.

If Au.D. programs, as shown in this review of curriculums, continue to provide heterogenous courses to their students, clinicians across the country will continue to provide varied levels of service to their patients. Although research in the field is prolific and the roles and responsibilities of audiologists expand, the field will never increase in quality and respect if all Au.D.s are not providing high quality and evidence-based services. The need for research into the impact of current curriculums on quality of service is necessary, but it is clear, that changes must be made to facilitate the education of audiologists in the United States.

RECOMMENDATIONS

The 2018 revision of the ASHA Scope of Practice expanded on many areas of psychosocial support and treatment that audiologists have a role within. It is clear from the changes to the document that the leaders of audiology see the role of increased patient-centered care, shared decision making and intra-professional communication.

The Scope of Practice document serves to provide guidelines for the roles and responsibilities an audiologist can do, however, ASHA has always noted that one's individual experiences, knowledge base, and exposure to skills have a formidable, and ultimately the most decisive role in shaping the areas of the field that an audiologist practices. Based on this, a well-rounded and thorough Au.D. education is paramount to the education of audiologists who are knowledgeable in every area of the profession and related professions.

Audiology education is not, and should not, be limited to the diagnostic roles that we serve in health care. As illustrated by the Scope of Practice, audiologists should be expert in counseling, cultural issues, screening of mental status, and communication with other professionals. The review of the Au.D. programs in the United States, however, shows that the same level of education is not being equally provided to all students. While all receive training in audiometric and amplification techniques, some students do not receive direct training in vestibular treatment or cochlear implants. Even fewer are provided dedicated course hours for counseling, aural rehabilitation, and multicultural issues. While these topics may be discussed within other classes, the presence of individualized courses on these topics within other curriculums indicates their importance.

The variation of classes can be argued as a benefit for the field, as each student is provided with different experiences, making a heterogeneous population of critical thinkers which could lead to innovation. However, the entire profession of audiology needs to ensure that every patient, regardless of the professional they are seeing, is provided with the same quality of service. Research has shown that variability in audiology practice is high and to allow for this to continue would be irresponsible of the entire field.

I propose first a revision to the CAA accreditation requirements for Au.D. programs. Revisions should include new topics within the field, such as cochlear implants, telehealth, and personal sound amplifiers. Additionally, it is my belief that the number of Au.D. programs within the United States should be decreased. Each program maintains relatively small cohort sizes. These small class sizes only add to the variability among Au.D.s. Additionally, the aging of faculty at current institutions and the lack of new PhD level faculty will eventually lead to shortage of higher education level audiology professors. Limiting the number of Au.D. programs will funnel these educators into a fewer number of higher quality programs, hopefully decreasing the impact a PhD shortage will have on the field. While the need for audiologists is only expected to grow, respect for the field will fail to grow if professionals are not providing high level, consistent, and evidence-based services.

While changes to the CAA accreditation requirements is necessary, Au.D. programs can improve their curriculums internally to address changes and trends seen within the field. Review of the course offerings revealed that many universities need to reexamine their classes to ensure that all major aspects of the Scope of Practice are addressed. Vestibular treatment and assessment, audiological diagnostics, treatments including hearing aids, implantable devices, and personal sound amplifiers, and aural rehabilitation should be taught at all universities, preferably with courses specifically dedicated to each topic. The fundamentals of audiology, acoustics, psychoacoustics, and anatomy, for example, should be specifically addressed as well.

The lack of facility and size of programs also prevents specialized or elective courses from being provided at many universities. Pediatric audiology, for example, can encompass diagnostics, hearing aids, cochlear implants, balance assessments, auditory processing evaluations, educational options, counseling for parents, and communication with teachers or

other therapists, among other things. While these topics, ideally, would be addressed in at least one setting at all universities, few offer elective courses that delve specifically into the care that pediatric patients need. Similarly, treatment of adults differs dramatically from that of children and can be elaborated on, if a student is interested and a university has the resources to provide the class. Some universities currently provide specific geriatric audiology courses. One choice universities can make when updating their curriculums would be to provide courses that look across the populations that are served by audiologists. It would be wise to dedicate similar portions of course time to topics within the Scope that can be addressed differently in the various demographics. For example, pediatric amplification and adult amplification topics should be equally covered within a curriculum. By making these changes, all Au.D. graduates would be well rounded and capable of working in any area of audiology. Additionally, no new student would have to choose a program based on a specific topic that they were interested in that may be covered at one university and not within another.

The updated Scope of Practice should be used as a guideline to create new curriculums. The importance the Scope of Practice placed on counseling of patients is not adequately reflected in Au.D. course offerings, where only 52 programs offer specific counseling courses. Diversity, and its impact on patient-centered care, was highlighted throughout the ASHA Scope of Practice, yet, only 6 programs offer a course dedicated to multicultural issues. Universities must examine the Scope of Practice and incorporate these topics. If changes are not made, Au.D. graduates will be underprepared and the whole field will suffer.

The field of audiology has a past and a present of constant changes and improvements to clinical work. While these changes are beneficial to our patients, clinicians must be properly trained in all aspects of the Scope of Practice in order to provide services at the top of their

license. Current standards for Au.D. level curriculums provide guidelines regarding topics that all Au.D. students should be taught, however, a review of the current curricula in the United States revealed that areas within the Scope of Practice are not provided the same attention across universities. This diversity can lead to differences in practice and ultimately hurt the entire field of audiology and the patients we serve. Changes must be made to the way that Au.D. programs approach changes to their curriculum and classes must change with the advancements in the field.

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