Effective Remote Clinical Education
Growing Student Competencies

Better Hearing Health Across the DoD
Cognitive Screening Practices Among Audiologists
‘Normal’ Hearing and Hearing Loss Some Observations
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Planning Effective Remote Clinical Education.
During spring 2020, higher education faced drastic changes to education delivery due to the coronavirus pandemic. The University of Texas at Dallas developed remote clinical education models to meet clinical hours and continue the growth of student competencies across the scope of practice.

By Stephanie L. Fowler, Shawna Jackson, Andrea Gohmert, and Carol Cokely

Better Hearing Health Across the Department of Defense.
This article provides insight into today’s military hearing-health practices and innovations. The DoD continues to address the unique challenges and hearing needs of its military service members, civilians, and Veterans through collaboration, conservation, and surveillance to enhance performance and safety.

By Theresa Y. Schulz, Amy Blank, April J. Taylor, and Kelly S. Paul

Some Observations on ‘Normal’ Hearing and Hearing Loss
Ask an audiologist what “normal” hearing is and, not surprisingly, you will get a variety of responses. How we define “normal” in regard to pure-tone hearing is deeply entwined in our differential diagnosis and treatment recommendations and, therefore, has significant implications for people with hearing loss.

By Christopher Spankovich

Cognitive-Screening Practices Among Audiologists
Despite calls for greater consideration of cognitive ability by audiologists, we know little about current practice in this area. This article describes the results of a survey designed to gain insight into how audiologists are attending to cognitive decline in their patients and, if they are not, what barriers they perceive.

By Sarah Black and Pamela Souza
The American Academy of Audiology publishes Audiology Today (AT) as a means of communicating information among its members about all aspects of audiology and related topics. AT provides comprehensive reporting on topics relevant to audiology, including clinical activities and hearing research, current events, news items, professional issues, individual-institutional-organizational announcements, and other areas within the scope of practice of audiology.

Send article ideas, submissions, questions, and concerns to Erin C. Schafer, editor-in-chief, at dr.erinschafer@gmail.com.

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The American Academy of Audiology promotes quality hearing and balance care by advancing the profession of audiology through leadership, advocacy, education, public awareness, and support of research.

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Implicit Bias and Allyship

In June, Academy leadership invited audiologists and students who self-identify as Black to join in creating institutional change. A seven-member steering group was created from respondents to:

1. Identify a process for facilitating discussions among Black audiologists about personal experiences and priorities.

2. Facilitate virtual meetings with Black audiologists for exchange of information.

3. Identify common themes and priorities.

4. Develop recommendations on next steps for the Academy.

5. Work with the Academy Board of Directors to identify a sustained approach for change in the culture of the Academy.

This work is in progress and the Board of Directors received an update at the July Board meeting.

I recognize that the Black audiologists who are part of the steering group and the others joining the dialogue may not have planned to assume the role of activist along with their audiology duties. However, I am very grateful to them for stepping up to this challenge and adding more work and stress to their days and evenings. Now others of us, too, must step up to the challenge.

I am sharing below materials recently used by the Academy’s board, council chairs, and partner board chairs to examine implicit bias and allyship. Each of us in this group—predominantly white—reviewed the materials as homework and then came together to discuss how we can infuse allyship into the work of the Academy. I am asking our membership to join this effort and also to review the materials.

Before reading any further, I encourage you to go to https://implicit.harvard.edu/implicit/takeatest.html and take the Race Implicit Association Test (IAT), which provides a tool to discover hidden cognitive biases related to race.

Most people are aware of their explicit biases, but it is difficult for us to become aware of our implicit biases. Implicit bias refers to the attitudes or beliefs that affect our understanding, actions, and decisions in an unconscious manner. It is important for each of us to acknowledge and manage implicit biases if our goal is to become an ally.
Congressman and civil-rights leader John Lewis (2/21/40-7/17/20) spoke directly of allyship:
“Swimming against the current isn’t easy, but it’s necessary to reach the goal...It only takes one to start the conversation, and allies are needed to finish it. And that’s the very essence of ‘good trouble.’”

We have started the conversation and we need an Academy of allies to move this work forward.

I encourage you also to access the four-part series on allyship at https://counseling.ufl.edu/resources/bam/. Take the time to fill out the Social Identity Wheel that helps us think about the individual lens we use as we approach the world and how this might impact our ability to be an ally.

An ally takes on the responsibility of (1) acknowledging and openly talking about our privileges, (2) listening more and speaking less, (3) using direct communication and integrity, (4) not expecting to be educated by oppressed group members, (5) growing in our capacity to be challenged, (6) embracing the complex emotions that come from allyship, and (7) not expecting awards or recognition.

There is no one way to be an ally. We hope some of these materials will encourage dialogue and discovery of what sphere you will influence positively (your family, your colleagues, associations, communities).

Allies focus on impact rather than intention. Inclusion means that the voices that need to be heard are in the room; that is what success will look like. Together we can create a culture of inclusion at the Academy.

Although the focus at this time is on Black audiologists, this work is setting the stage for the work that needs to be done to guarantee inclusion in the Academy of all individuals who identify with a marginalized group. This work is designed to benefit all our members and the patients we serve. I look forward to continuing this work as past president of the Academy and I know the incoming president, Angela Shoup, will continue to make this work a priority.

Catherine Palmer, PhD
President
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The RAS TT single monitor Teleaudiology station is ideal when space is limited. It is designed to help professionals be there for their patients and maintain infection prevention distancing as the world continues to respond to the COVID-19 pandemic. The cart is lightweight, compact, making the system easy to store when not in active use.

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British Society of Audiology Annual Conference 2020
www.thebsa.org.uk/events/event/bsa-annual-conference-2020

October 30–31
Virtual Conference
South African Association of Audiologists Annual Conference 2020
https://easternsun.eventsair.com/saaa-2020

What’s Trending!

What are CROS and BiCROS hearing aids? Academy President Dr. Catherine Palmer weighs in on unilateral hearing loss and when to see your audiologist or ENT. Published on July 28
www.facebook.com/theamericanacademyofaudiology

In January 2020, the Academy published its clinical guidance document on the assessment of hearing in infants and young children. Published on July 16
www.twitter.com/academyofaud

Audiologists, whether seasoned providers or new to the field, can advance our cultural competence by being mindful of the cultural and linguistic diversity of the patients we serve. Published on July 2
www.linkedin.com/company/american-academy-of-audiology

Early hearing detection and intervention (EHDI) activities, beginning at the birth hearing screening, result in early intervention and a positive outcome for children who are deaf or hard of hearing. Published on July 22
www.instagram.com/academyofaud

Published on July 22
Planning Effective Remote Clinical Education

Growing Student Competencies

BY STEPHANIE L. FOWLER, SHAWNA JACKSON, ANDREA GOHMERT, AND CAROL COKELEY
During spring 2020, higher education faced drastic changes to education delivery due to the coronavirus pandemic. The rapid change challenged clinical education goals due to clinic closures and the cessation of student participation in patient care and hands-on laboratory experiences.

The clinical coordination team at The University of Texas at Dallas focused on the clinical education of its AuD students and telehealth service delivery—and to embrace a journey that could improve student education and patient care.

The feedback from audiologists and students
suggested they benefited and confirmed that these lessons will be incorporated moving forward.

Given the rapid necessity of remote clinical experiences, the Council on Academic Accreditation (CAA) and the Council for Clinical Certification in Audiology and Speech-Language Pathology announced changes to the process of AuD education. While the councils maintained the number of required clinical hours (the equivalent of 12 months of full-time experience for externships) and the proportion of hours allowed via simulation (10 percent), the nature of the
simulated hours was expanded to include case-based discussion models through August 1, 2020. Furthermore, students were credited for remote participation in telehealth experiences compared to previous shoulder-to-shoulder preceptor-student models (CAA, 2020).

With these guidelines, the clinical coordination team developed three modes of remote clinical education: simulated case sessions, telehealth clinic sessions, and virtual clinic sessions.

Simulated case sessions were those in which clinicians collated case studies and used debriefing to guide students through the evidence-based diagnostic, rehabilitation, and counseling processes that occur in face-to-face encounters. Up to six students participated in these sessions, which were scheduled for one to two hours per week and included clinical assignments.

Telehealth clinic sessions became available as clinicians became confident with the technology, in compliance with HIPAA guidelines. Efforts were supported by manufacturer trainings, our information technology and HIPAA team, and our business associate agreement with Microsoft Teams (Microsoft, 2020). Clinicians securely videoconferenced with patients and students for remote hearing aid programming, aural rehabilitation sessions, and hearing aid checks with established patients.

Virtual clinic sessions converted our typical interactions into off-site student participation in clinic. Through virtual clinic sessions, patients, and clinicians were face to face and a secure videoconference was established with students, who could speak directly with the patient and operate the clinician’s computer remotely (FIGURE 1).

The clinical coordination team developed three modes of remote clinical education: simulated case sessions, telehealth clinic sessions, and virtual clinic sessions.

Protocols established the standardized processes among all clinicians. Feedback from formalized surveys and informal conversations enhanced student and practitioner experiences. In each remote clinical education model, the lessons learned will
influence the future of AuD education and patient service.

**Simulated Case Sessions**

In the initial wave of stay-at-home orders, our clinicians were faced with work-from-home time and new responsibilities of developing cases and guiding student learning through new media, in addition to their clinical projects that could be completed remotely.

Students appreciated how the simulated case reviews were slower than typical clinic encounters, allowing time for critical thinking. They asked questions that they otherwise wouldn’t have while maintaining an efficient in-person clinic encounter. Many clinicians used the simulated case time to introduce detailed use of hearing aid software, inventories, and other clinical tools.

Coincidentally, 2020 began with new ASHA requirements for continuing education in clinical precepting for supervising clinicians, mostly obtained through the eLearning modules developed by the Council of Academic Programs in Communication Sciences and Disorders (CAPCSD, 2020). Therefore, clinicians had a foundation in best practices of clinical education, including feedback, assessment of student learning, and fostering effective student-clinician relationships.

The implementation of clinical educator competencies became particularly important in the online environment. Relationships between students and clinicians no longer hinged on shared—but primarily clinician-directed—tasks necessary to keep a schedule on track; rather, much of the discussion was student-led. Thus, clinicians spent more time addressing skills in which students felt less confident.

Audiologists often express that student interactions improve their own skills. This remained true in the remote environment. In preparing de-identified case studies, clinicians revisited cases with new, sometimes more experienced, eyes. Student questions prompted clinician self-reflection in ways that could not have been explored in depth during the pace of in-clinic appointments.

Students appreciated how the simulated case reviews were slower than typical clinic encounters, allowing time for critical thinking.
Though repetition is a vital part of the learning process, student-clinician relationships are enhanced when students can ask their most pressing questions and have dedicated instructors answer with their real-world and evidence-based experiences.

Simulated case sessions, particularly for the early cohorts, included use of clinical audiometry simulators, such as CounselEAR, and testing demonstrations on YouTube. These materials were screen-shared and clinicians prompted student thinking across numerous patient profiles.

Other simulations were researched for use in small groups once a return to campus was allowed for coursework and for remote access. These include the AudSim audiometric testing and masking simulator (https://audsim.com/), Otosim otoscopy demonstrators (www.otosim.com/), simulated ABR (sABR) (Herdman, 2020), Baby Isao from Intelligent Hearing Systems (IHS, 2020), and Baby- and Base-CARL (www.aheadsimulations.com/). This research suggested that our audiology colleagues have been developing high-quality simulators that can supplement clinical education of all kinds.

Initial surveys obtained after the first weeks of simulated cases generated positive and constructive responses from the students and faculty. All parties reported the anticipated confusion regarding online platforms and concern about the potential impact to clinical proficiency and graduation requirements. However, by the end of the semester, most students and audiologists were impressed with how well the simulated cases kept their audiological critical-thinking skills sharp.

**Telehealth Clinic Sessions**

Telehealth is undergoing substantial development and advocacy within the field, recognizing its potential to expand clinic operations to the cutting edge of patient accessibility. Although telehealth is a long-standing model, its uptake was somewhat limited in hearing-health care. The pandemic necessitated quick and large-scale operations, which could not have happened without collaboration among all parties.

Challenges included identifying the sessions that could be moved onto a telehealth platform, such as hearing aid checks, aural rehabilitation sessions (often with family members in other locations), and remote programming with capable devices. Clinicians were adaptable to the remote-delivery model, prioritizing checking in on their patients with recent hearing aid deliveries, hearing tests, and those with known, needed follow-up.

The limitations to traditional delivery challenged clinicians to come up with creative solutions to problems, such as teaching patients via videoconference to change wax guards. In addition, we recognized a need for common troubleshooting videos to which we could direct patients for self-help resources. By creatively solving such problems, clinicians exercised the very concept of self-advocacy we emphasize for patients, recognizing what they needed and effectively advocating for themselves and their patients in challenging situations.

Similarly, students were challenged to learn in new
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ways. Remote interaction allowed automated live captioning, reinforcing lessons about clear communication with patients. They learned that captioning was more accurate and in sync with their voices when they slowed their speech—a skill we often cannot directly teach in clinic, but which is very important when speaking with our patients. The students also learned that they needed more specific verbal communication about hearing aid-related tasks (i.e., orientations and checks), when the easier, but less effective, option of doing the tasks for the patients was removed.

Though we recognized that a pivot to include telehealth services was in the future for the profession of audiology, we will be refining how best to continue to use telehealth in compliance with HIPAA and licensure laws. It was clear that patients appreciated the ability to include family members who could not otherwise attend an appointment. In addition, the opportunity to stay in touch with patients at risk for isolation was imperative to maintaining the rapport between patient and clinician.

Virtual Clinic Sessions

After weeks of simulated cases and telehealth service delivery, the Callier Center began phased reopenings, with clinicians allowed back on campus while students were still restricted to remote education. Patients returned to the clinic for needed testing and reprogramming of devices. At first, students continued to participate remotely while patients and clinicians interacted in person in the clinic.

The prior experience with the telehealth services and videoconferencing platform led to a smooth transition to virtual clinic sessions. By connecting an external microphone close to the patient and using our existing TV monitors and external loudspeaker as the duplicated computer screen and external sound source for the students’ voices, respectively, our clinic booths were established with this new capability, for approximately $30 each.

Changes to standard clinical process resulted from the simultaneous emergence of revisited infection-control policies and remote education. For example, in response to Centers for Disease Control (CDC) recommendations, audiologists across the country wear masks, inevitably reducing the audibility and visual cues available to patients.

By enabling the remote-education model, the student can communicate to the patient via the TV screen without wearing a mask and, for enhanced communication, automated live captioning can be enabled for the patient, clinician, and student. Similarly, because the remote-screen-control features within Microsoft Teams allow students to operate the computer remotely, clinicians who are wearing gloves for tasks don’t need to take a glove off to operate some computer-based programs.

Students enjoyed being on the cutting edge of these experiences, albeit through a trial-and-error process.

“It was rocky the first week, since this was a totally foreign concept for us, but by the end of the semester, it was a great experience overall,” Payton Brown, a second-year student, said. “I have learned new skills via online clinic and got to focus on the counseling piece more than I would in person. The best part of this whole process is that I now can utilize telehealth services in the future, if appropriate.”

Remote education experiences are not without their limitations. For example, in this model, some diagnostic testing, such as evoked
Planning Effective Remote Clinical Education

potentials, is accessible only by observation. Therefore, in-person modes remain the cornerstone of clinical education endeavors.

However, with open minds, patience, and dedication, clinicians developed new skills and modeled a professional team approach in some of the most challenging situations we have yet faced as a profession.

Fortunately, while there was the initial stress associated with such a big change in our program, students adapted quickly and found ways to make this learning process even better than we could have expected. In fact, many of them were so grateful for these experiences that they enthusiastically suggested we incorporate the varying remote clinical education models into our standard clinical instruction.

Summary

Clinical education requires adapting to changing circumstances, where new students, new patients, and advancements in clinical best practices create an exciting laboratory for high-quality patient care and student learning. In the unexpected circumstances brought about by enhanced health and safety precautions, this experience is no different. All parties involved—students, clinicians, administrators, and patients—responded innovatively to the challenges presented.

Students were able to overcome their initial hesitations to master new technologies, while simultaneously managing their changing home environments. Incidentally, we learned much about our students’ challenges. For example,
Many students’ internet access was unstable, as everyone in their neighborhoods moved to remote work, reducing internet bandwidth. Some students adjusted to shared office spaces and managing the remote education of their school-aged children. We even got to meet many students’ pets, an unexpected but delightful side effect of remote education!

Equally important was the mentorship that each clinician provided during these times, by diving headfirst into supplementing the clinical education of students in an entirely novel way. By investing time, energy, and compassion in the process, clinicians shaped these experiences that will continue to be important in our clinical education, modeling how to be an adaptable and ever-learning audiologist.

Finally, administrative support was necessary for this undertaking, including the business associate agreement that allowed for secure remote education and telehealth, the extensive technical support provided on-site and remotely by the information technology team to ensure security in sessions, and the willingness to believe that true student learning can happen with the right mixture of student-educator relationships, feedback, and assessment.

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References


Better Hearing Health

Across the Department of Defense

BY THERESA Y. SCHULZ, AMY BLANK, APRIL J. TAYLOR, AND KELLY S. PAUL
This article provides insight into today’s military hearing-health practices and innovations. The DoD continues to address the unique challenges and hearing needs of its military service members, civilians, and Veterans through collaboration, conservation, and surveillance to enhance performance and safety.

Originating from the rehabilitation of noise-induced hearing losses (NIHL) incurred during World War I and II, the Department of Defense (DoD) has historically led the fields of hearing conservation and audiology (Bergman, 2002).

In fact, the earliest hearing-conservation regulations came from the military services with the Air Force in 1956. The change that the U.S. Army made to the Army Hearing Program in 2008 to make hearing capabilities rather than hearing-loss prevention the primary focus has continued this tradition of innovation and leadership.
That leadership and innovation endure as significant changes continue to challenge the Military Health System. The United States (U.S.) military health-care systems have been reorganized under the Defense Health Agency (DHA). The DHA is a joint, integrated combat-support agency that delivers the quadruple aim of:

1. Increased readiness,

2. Better health,

3. Better care, and

4. Lower cost.

The military has the latter three of these aims in common with our non-military audiology colleagues. Unique to the military is that our primary aim is readiness. We maintain physical, mental, and medical preparedness to deploy when needed, during both peacetime and wartime.

While undergoing the largest merger of health-care systems ever attempted, the DHA has worked closely with the services to provide medical readiness and health-care delivery that is more integrated, efficient, and effective than ever before (U.S. Defense Health Agency, 2020).

The Air Force, Army, and Navy have active duty (military), as well as civilian audiologists and technicians. We partner with industrial hygiene, public health, occupational health, and safety to deliver hearing-loss-prevention care.

In 1978, military hearing-conservation programs were standardized across the three services with the publication of a U.S. Department of Defense Instruction (DoDI 6055.12, 2019).

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<th>TABLE 1. Comparison of Some Key Differences Between Occupational Safety and Health Administration and Department of Defense Regulatory Requirements</th>
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This document is updated periodically to provide guidance and requirements for hearing-conservation implementation. Although there are some differences among service programs, all the programs collaborate in many ways. The DoD Hearing Conservation Working Group has representatives from each service who provide expert consultation to the Department of Defense on noise control, hearing injury metrics/trends, hearing-loss prevention, and hearing-conservation research initiatives.

At the direction of Congress, the DoD created the Hearing Center of Excellence (HCE) 10 years ago. The HCE is organized under the U.S. Defense Health Agency (2020) and provides hearing-health expertise to enhance operational performance, medical readiness, and quality of life.

At both the DoD and service levels, military hearing-conservation programs are more stringent than the Occupational Safety and Health Act (OSHA) in many of their requirements. Table 1 details some of those differences. For example, note that DoD requires hearing protection at 85 dB and uses a 3 dB exchange rate.

**Hearing Conservation in the Military**

Each of the military services has a public health organization that is responsible for its hearing-loss-prevention program. The U.S. Navy and Marine Corps public health services fall under the Navy Bureau of Medicine and Surgery.

The Army Hearing Program is under the U.S. Army Public Health Center and the Air Force Hearing Conservation Program is under the public health branch of the Air Force Medical Readiness Agency.

DoD regulations require collaborative efforts between military operational leadership and medical leadership.

Due to significant noise exposures unique to warfighters, both the Army and Marine Corps have enrolled most of their own personnel in the Hearing Conservation Program (HCP) (U.S. Department of the Army, 2008; U.S. Department of the Navy, 2016). In the Navy and Marine Corps, comprehensive HCP implementation and management involves strong collaborative partnerships among military leaders,
Better Hearing Health Across the Department of Defense

HEARING READINESS
In certain military occupational environments, distinct hearing and precise communications are critical; a lack of clear understanding can trigger serious consequences (U.S. Government Accounting Office, 2011). The inherent challenge is that service members’ hearing must be protected from hazardous noise damage without compromising the ability to hear and communicate in complex and chaotic environments (U.S. Department of the Army, 2008).

Hearing readiness is designed to ensure that military service members and noise-exposed civilians have the necessary hearing capability to perform their job-specific duties, as well as the appropriate and properly fitted hearing-protection devices (HPDs) for their mission.

Annual audiometric tests are administered to HCP enrollees through a standardized DoD-approved microprocessor hardware and software system. Noise abatement/reduction efforts, annual hearing-conservation education sessions, and HPD fittings are important precursors for

FIGURE 1. Percentage of service members with hearing impairment greater than 25 dB. Source: Hearing Health Surveillance Data Review (U.S. Department of Defense, 2019).
hearing readiness. While audiograms do not prevent hearing loss, audiometric test results serve as an effective lagging indicator of hearing readiness and hearing-loss-prevention success.

DoD regulations require collaborative efforts between military operational leadership and medical leadership, leveraging the expertise of the audiologists and public health professionals to reduce noise hazards and prevent NIHL (U.S. Department of Defense Instruction, 2019).

The DoD provides hearing help to individuals, and sometimes groups of people, to enhance readiness and enable them to operate effectively as a team (i.e., during deployment). This is accomplished through hearing-loss-prevention outreach initiatives with noise-hazard commands, such as group education and hearing protection/communication device selection and fittings. These may focus on custom devices for various military specialties such as aviation, special operations, and military band members.

In some military environments, obtaining and wearing the proper HPD can mean the difference between life and death. Therefore,
Better Hearing Health Across the Department of Defense

it is imperative that the hearing health of DoD personnel is prioritized. Military personnel face unique challenges in training, flying, and combat situations and are exposed to hazardous noise from uncommon sources. This can include various military systems, machinery, vehicles, and weaponry.

DoD TRENDS IN DECREASED HEARING LOSS
After several years of increasing trends in hearing injuries at the turn of the 21st century (Institute of Medicine, 2006), one of the recent successes is an overall decrease in hearing loss for all DoD components. This improvement is associated with the implementation of multifaceted hearing-conservation programs administered by each service and the Hearing Center of Excellence (HCE) Comprehensive Hearing Health Program (CHHP).

According to a tri-service hearing-health review (Institute of Medicine, 2006), the percentage of service members with hearing loss (defined as greater than 25 dB) decreased from 21 percent in 2012 to 15 percent in 2018 (see FIGURE 1). The percentage of DoD civilians enrolled in service hearing-conservation programs with hearing loss also decreased, from 51 percent in 2012 to 40 percent in 2018 (see FIGURE 2).

INNOVATION
In support of the warfighter, the HCE, tri-service representatives, and associated DoD laboratories researched the impact of hearing loss on mission performance. The long-term goals of these efforts are to establish DoD accession (joining the military) and retention hearing-profile standards consistent with hearing-readiness requirements.

One ongoing effort that the Army is leading is the introduction of new fitness-for-duty criteria for hearing standards and use of the Military Operational Hearing Test.

Partnerships between DoD and industry are important to obtain improved hearing protection for military-unique environments.

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(MOHT) to replace the Speech Recognition in Noise Test (SPRINT).

The SPRINT was designed by the Army to predict communication difficulty in active-duty soldiers with hearing loss. The test includes either 100 or 200 pre-recorded monosyllabic words with multitalker babble (9 dB speech-to-babble ratio) delivered to both ears simultaneously.

The MOHT is a test battery, developed by Dr. Doug Brungart at Walter Reed National Military Medical Center, for evaluating auditory fitness for duty. This testing is administered to service members with auditory thresholds that exceed a set of criteria and is a better indicator of performance in the presence of noise.

The MOHT is composed of three components: the diagnostic audiometric evaluation, an evaluation of speech-in-noise using the Modified Rhyme Test (MRT), and an evaluation of spatial awareness determined by administering the Spatial Digit Test (SDT).

The services are pilot-testing boothless audiometry in remote and/or deployed environments. The Army recently sent an active-duty audiologist overseas with boothless technology (in cooperation with the HCE).

This proof-of-concept deployment yielded excellent results. The use of boothless audiometry is now being considered for implementation in multiple settings, such as point-of-injury care in remote locations and military operational environments.

The Navy is conducting a longitudinal study on hearing-protection checks to obtain personal attenuation ratings (PARs) and hearing-conservation training for Marines at recruit accession points. The Army is investigating fit-testing hearing protection prior to the use of excessively loud weapons. These are critical points in service members’ careers for providing vital, just-in-time, hearing-loss-prevention education.

The Air Force is exploring the development of a deep-fitting in-the-ear noise dosimeter to monitor noise exposure and validate hearing-protection effectiveness more accurately.

As we have come to understand, a service member’s dual need to protect hearing while maintaining situational awareness (this includes use of auditory information, with other sensory information, to understand/have an awareness of their environment) for operational performance, makes wearing hearing protection an ongoing challenge.

To address this need, the HCE, through key partnerships, is developing an HPD Evaluated Products List (EPL) that will enable warfighters to select the best HPDs for specific operational tasks and individual needs. This initiative will develop and implement standardized methodology to evaluate hearing protection and tactical hearing-protective systems, enabling selection based upon hearing-critical tasks and hearing-protection characteristics.

To date, the HCE and its partners have:

1. Created and disseminated the evaluated passive HPD poster and guidebook to enable hearing-health professionals, industrial hygienists, and safety professionals to better select passive hearing protection appropriate for the noise environment and hearing-critical tasks service members perform, and
Partnerships between the DoD and industry are important to obtain improved hearing-protection technology that enhances communication while effectively suppressing hazardous noise for military-unique environments.

With improved HPD selection and continued hearing-health education, ideally, warfighters will overcome previous trends of non-use of up to 50 percent due to reported concerns with comfort and communication, will be more inclined to use HPDs, and the DoD will continue to witness a reduction of hearing loss across all services (U.S. Government Accounting Office, 2011).

Other DoD Hearing-Health-Care Initiatives

OTOTOXICITY

Ototoxic chemical exposure evaluation and control are included in DoD regulatory requirements. Therefore, ototoxin risk assessments are incorporated as a component of DoD hearing-conservation programs.

If ototoxic chemicals (i.e., jet fuel, toluene, etc.) or heavy metals (i.e., lead, chromium, etc.) are present in hazardous-noise areas, the increased risks of hearing loss are evaluated, considering the synergistic and individual effects of chemical and noise exposures.

SURVEILLANCE

When Congress mandated the creation of the HCE, it called for a registry to document and track service member hearing loss and auditory-system injury and share this information with the VA. Ultimately, the registry is a critical tool that allows the DoD and VA to assess the impact of best-practice initiatives on service member and Veteran hearing and balance health outcomes.

The Joint Hearing Loss and Auditory System Injury Registry (JHLASIR) reached full operating capability on January 31, 2020. The registry’s benefits will continue to expand with the creation of new functionalities that provide an even broader resource for service member and Veteran hearing and balance health data.

Conclusion

During a time of fast-paced organizational changes, the DoD continues to innovate and lead the way toward better hearing health for its military service members, civilians, and Veterans. These efforts have resulted in a decrease in the percentage of service members...
and civilians with hearing loss enrolled in hearing-conservation programs.

To build on these successes, it is vital to foster continued collaboration among the services, as well as between military operational and medical leadership, in addition to partnerships between the DoD and industry.

The DoD will continue to address unique challenges and prioritize hearing readiness to ensure military service members and civilians have the necessary hearing capability and appropriate hearing protection to enhance operational performance. 

**DISCLAIMER**

Disclaimer: The views expressed are those of the authors and do not reflect the official policy or position of the Department of Defense or the U.S. Government.

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**References**


Some Observations on ‘Normal’ Hearing AND Hearing Loss

BY CHRISTOPHER SPANKOVICH
While hearing in the real world is much more complex than detecting the presence of brief pure-tone stimuli, hearing difficulty is highly related to pure-tone audiometry.
Some Observations on ‘Normal’ Hearing and Hearing Loss

What is ‘Normal’ Hearing?
Ask an audiologist what “normal” hearing is and, not surprisingly, you will get a variety of responses (FIGURE 1). Certainly, normal pure-tone threshold sensitivity does not rule out hearing difficulty or the presence of auditory pathology, including cochlear and auditory neural peripheral or central deficits. Further, a number of non-auditory factors can contribute to a patient’s perceived hearing difficulty (e.g., cognitive capacity, attention, medications, etc.).

While hearing in the real world is much more complex than detecting the presence of brief pure-tone stimuli, hearing difficulty is highly related to pure-tone audiometry. How we define normal in regard to pure-tone hearing is deeply entwined in our differential diagnosis and treatment recommendations and, therefore, has significant implications for people with hearing loss.

The Reference Sound-Pressure Level
The reference sound-pressure level for plotting auditory thresholds is 0.0002 dyne/cm² (also written as 20 µPa or 20 microbar). Notably, this reference sound-pressure level is found in most audiology textbooks, but the citation for a study or studies that establish this reference value is more difficult to find. Recent textbooks provide no citation.

Some of our readers, of course, know that the reference level was set by an international agreement as a value that reasonably approximated the threshold of hearing at 1000 Hz in healthy young adults. But who were these healthy, young adults? Unfortunately, you will find limited description, as the reference was, in reality, based on numerous studies over many decades.

Early work provided foundations to the ultimately agreed-upon
Some Observations on ‘Normal’ Hearing and Hearing Loss

reference sound-pressure level (Toepler and Boltzman, 1870; Rayleigh, 1877; Wien, 1903; Fletcher and Wegel, 1922; Fletcher, 1923). For example, Wien (1903) reportedly provided the first recorded estimate of the amplitude of just-audible sounds using an electromagnetic receiver as a source of sound and optical measurements of its diaphragm movement. The observer listened through a hole in a large screen 30 cm from the receiver.

Fletcher and Wegel (1922) made use of a vacuum-tube oscillator, condenser transmitters, and thermal receivers to examine hearing sensitivity in 93 presumed normal ears (males and females, at least 20 females) and reported in dynes per square centimeter (dynes/cm²). The testing was completed in a room layered with loose felt, sheet iron, and cheese cloth.

The results were compared to other work of the time, including Wien, Webster, Rayleigh, and the others listed above. The pressure required for perception fell near approximately 0.001 dynes/cm². Reviews of this early work can be found in Fletcher’s Speech and Hearing (1929).

Sivian and White (1933) also reviewed much of the research of the time and published what they believed were the best weighted means of minimum audible pressure (earphone) and minimum audible fields (sound field) in data collected from 14 presumed normal hearing persons (called observers). The observers included 10 male and four female participants mostly ages 18–26 years (one participant was 40 years old). At 1000 Hz, the minimum audible field required was reported as 1.9 x 10⁻¹⁶ watts/cm².

What should be the cutoff for a 'normal' pure-tone audiogram?

Around the same time, Fletcher and Munson (1933), in their paper “Loudness, Its Definition, Measurement, and Calculation,” identify their reference intensity as 10⁻¹⁶ watts/cm² corresponding to a pressure 0.000204 bar, the first published use of this reference the author could find. The explanation: “an intensity of the reference tone in air of 10⁻¹⁶ watts/cm² was chosen as the reference intensity because it was a simple number, which was convenient as a reference for computation work, and at the same time it is in
Some Observations on ‘Normal’ Hearing and Hearing Loss

In 1949, at the International Congress of Audiology in London, Edmund Fowler and Erhardt Lüscher proposed many standards, including 0.0002 dynes/cm² as the standard for sound pressure at 1000 Hz. The remaining frequencies were proposed to be set to Fletcher and Munson’s equal loudness contours that used the same reference because it was an easy number and fell within the general range of minimal audibility.

Despite this proposal for the reference value, for a few years following, variable references were used; commonly “dB above 1 dyne/cm².” The issue, of course, is that 1 dyne/cm² is already higher than conversational speech, which resulted in negative values.

The earliest basis for audiometric zero was based on data from the U.S. National Public Health Survey in 1935–1936. These data were the basis for the 1951 American standard (American Standards Association, 1951). After World War II, actual average normal thresholds across the frequency range, notably by groups from the United States (U.S.), United Kingdom (UK), and Japan were further pursued.

As expected, discrepancies were found. Wheeler and Dickson (1952), researchers from the UK, questioned this standard due to concerns regarding the age of the participants, the clinical condition of their ears, ambient noise level, and method of testing. So, they completed their own study.

The data from Wheeler and Dickson (1952) was completed in males only, ages 18–23 years. The data showed thresholds some 10 dB better than the American standard. Wheeler and Dickson reported their data relative to 0.0002 dynes/cm².

Their data and those of numerous other groups (e.g., Dadson and King (1952), who also completed similar studies, in both males and females) set the standard for the International Organization for Standardization (ISO) in 1963. In 1969, the U.S. published new standards comparable to the ISO values based on updated data from Aram Glorig and colleagues (Glorig et al, 1956). These have been updated over time.

The ‘Normal’ Range Around Average ‘Normal’ Hearing

What should be the cutoff for a normal pure-tone audiogram? More importantly, what is the literature-based evidence for this selected boundary? As reviewed, the reference zero is a well-estimated guess of the lowest detectable sound a human adult with presumed normal hearing sensitivity can hear.

Of course, we expect variability around the average level and accept some variance in our measurement. In the world of research, an oft-used cutoff for statistical significance is two standard deviations (SD) removed from the mean. In statistics, the SD is a measure of variation.

Two SD of the mean (of a normal distribution) accounts for 95 percent of the variance. The variance for pure-tone audiometry is close to approximately 5 dB SD on average (dependent on frequency); two times the standard deviation (or 2 SD) would suggest normal = 10 dB within the mean normal (0 dB HL). Applying 15 dB as the cutoff corresponds to about 3 SD, which accounts for 99.7 percent of the variance.

Statistically speaking, 15 dB HL is a conservative cutoff for normal variance around the mean of 0 dB HL for normal hearing and higher would be considered statistically significant by
Some Observations on ‘Normal’ Hearing and Hearing Loss

most statistical designs. Also, the opposite, someone with thresholds at < -15 dB HL should be recognized for super hearing! (Okay, just kidding.) However, it is likely the average lowest detectable sound level is skewed toward 0 dB HL and above.

This is also in line with what we consider a clinically significant change in hearing or a significant threshold shift (STS). A change in hearing greater than 10 dB at multiple frequencies and 15 dB at a single frequency is routinely considered a significant threshold shift (Centers for Disease Control and Prevention 1998). Unfortunately, we do not often have a baseline audiogram.

A patient complaining of hearing difficulty presenting with thresholds at 10–25 dB HL may be dismissed as having normal hearing. Nonetheless, it is plausible that, 10 to 15 years ago, their thresholds were at 0–10 dB HL.

Defining Hearing Loss Using Pure-Tone Audiometry

Numerous definitions of hearing loss exist and are related to their application. A determination of occupational injury compensation or epidemiological studies of prevalence and incidence of hearing loss may use different definitions of hearing loss based on pure-tone audiometry and other methods. For example, in the 1940s, the Army, Navy, and Veterans Administration used a conversational voice test at 20 feet. If the person could hear and repeat the words, the tester would approach foot by foot until the words were repeated correctly; 20/20 was considered normal hearing and 10/20 partial hearing loss (Carter, 1943).

Prior to the updated American National Standards Institute (ANSI) standard in 1969, the American Academy of Ophthalmology and Otolaryngology (AAOO) in 1959 devised a means for determining a percentage of loss of hearing for speech. The creation of this percent loss was based on earlier work by the Council on Physical Medicine consultants on audiometers and hearing aids for a uniform

There is a rich history of defining hearing loss on the pure-tone audiogram.
way to estimate percentage of hearing loss for speech for legal purposes.

This was set at the average of the hearing levels at 500, 1000, and 2000 Hz with 1.5 percent impairment for each decibel that this average exceeds 15 dB. The original proposals were more complex, including weighted decibel loss of the better and worse ear and statistical measures (Fowler, 1942; Sabine, 1942; Harris et al, 1955).

However, these means for determining percentage of hearing loss were based on reference zero levels that generated thresholds some 10 dB poorer than the updated standard and the corresponding ISO standard (1963). The response to “correct” this issue was to simply increase the “low fence” of normal audiometric threshold by about 10 dB HL.

The AAOO (1979) formula computing hearing impairment for speech did just that, establishing a 25 dB HL cutoff for normal hearing. However, other suggestions were abundant, including a return to using the reference 0.0002 dynes/cm² and not dB HL (audiometric zero).

Through the years, other methods were proposed with additional consideration of the ability to understand speech-in-noise. For example, early work from Kryter et al (1962) and Harris (1965) demonstrated that, with distorted signals and noise, speech understanding was compromised with elevated thresholds at 3000 and 4000 Hz.

The AAOO 1979 formula added 3000 Hz to reflect a more realistic degree of speech understanding, not only in quiet, but also in the presence of some noise. See Clark (1981), “Uses and Abuses of Hearing-Loss Classification,” for further review.

There is a rich history of defining hearing loss based on the pure-tone audiogram. However, even Fletcher, Fowler, and other foundational figures of the time recognized the limitations of pure-tone audiometry alone in the determination of hearing disability and speech recognition (see review by Harris et al, 1955). Interpretation of pure-tone audiometry and the determination of hearing loss has remained a debated topic.

In 1981, John Greer Clark completed an in-depth review of the methods to calculate hearing impairment. As Dr. Clark points out, most hearing-loss classification systems from the 1960s to the 1980s designated 25 dB HL as the cutoff for hearing loss. Yet, at that time, many investigators began to recognize the adverse effects of even slight hearing loss in children, which included Northern and Downs (1978) adopting a definition of 15 dB HL for children.

In an attempt to recognize the implications of thresholds 15 dB HL and greater in adults as well, Clark proposed a modification to the Goodman (1965) classification that included slight hearing loss from 16–25 dB HL. Martin and Clark (2000) and Martin and Champlin (2000) further advocated for a 15 dB HL upper limit of normal hearing sensitivity.

Martin and Champlin (2000) examined hearing difficulty to support this line. In their study, they reviewed data generated by a hearing aid manufacturer that included a breakdown of the degree of hearing loss based on pure-tone average (PTA) (500, 1000, 2000 Hz). It was the assumption that persons purchasing hearing aids did so due to perceived hearing difficulty.

They found that, of the 556,000 patients, nearly 30,000 (5.3 percent) had PTAs less than 25 dB HL. They, of course, acknowledged that higher frequency hearing loss was likely
involved, but based on the classic definition, these persons had normal hearing.

Spankovich et al (2018), using population-based data, found that, among National Health and Nutrition Examination Survey (NHANES) participants with normal hearing, defined as greater than or equal to 25 dB at all frequencies from 500 to 8000 Hz in both ears, 10.4 percent reported hearing difficulty.

When the cutoff for normal was lowered to 15 dB HL, a slightly lower 9.9 percent of individuals reported difficulty. However, when reduced to 5 dB HL, only one participant reported hearing difficulty. This suggests that, even at 15 dB HL, patients can report some hearing difficulty, but as you approach a 0 dB HL cutoff (average normal hearing), it becomes less likely.

There is also correlation of pure-tone audiometry to objective measures of auditory function. Otoacoustic emissions (OAEs) show a relatively strong correlation with pure-tone average and fair correlation with reported hearing difficulty (Engdahl et al, 2013).

Hussain et al (1998) showed separation of transient-evoked OAEs (presented at 70–80 dB peak SPL) amplitudes when thresholds increased above 15–20 dB HL at 3000 and 4000 Hz; a clear reduction in amplitude was observed. Similar relationships have been observed for distortion-evoked OAEs (using 65/55 dB SPL primary levels) (Gorga et al, 1999).
Auditory brainstem responses show a comparable relationship to pure-tone audiometry, with general lower amplitude and delayed latency with high pure-tone threshold (Hall, 1992). Interestingly, Bramhall et al (2015) showed a relationship between wave I amplitude and speech-in-noise performance, but not until PTA increased above approximately 15 dB HL.

Guidelines, Standards, Anyone?
What do our professional organizations tell us? If you go to the websites of the American Academy of Audiology (AAA: www.audiology.org/sites/default/files/publications/Audiogram2012_EngSample.pdf) and the American Speech-Language-Hearing Association (ASHA: www.asha.org/public/hearing/Degree-of-Hearing-Loss) and look for their cutoffs for normal hearing, you will see a familiar value. Both the Academy and ASHA recommend the 15 dB HL cutoff of normal hearing classification based on pure-tone audiometry.

So What Is ‘Normal’ Hearing and Hearing Loss?
The better question is what is “normal” pure-tone audiometry? From the literature, we can surmise that the lowest average detectable sound pressure corresponds to approximately 20 µPa (0.0002 dynes/cm²) in young adults. And, the average lowest SPL with 20 µPa as our reference corresponds to audiometric zero. There is more than a century of research to support average normal pure-tone audiometry thresholds (i.e., audiometric zero).

Where we draw the line for normal hearing is more complicated. It is complicated because pure-tone audiometry only in part captures hearing ability. There is a strong correlation among audiometry (and various pure-tone average calculations), perceived hearing difficulty, and objective measures of auditory function. Nonetheless, pure-tone audiometry and objective measures have limitations for sensitivity and specificity to some variants of hearing loss and perceived hearing difficulty, notably for synaptopathic-neural and central deficits.

Despite this limitation, where we begin to observe deficits in functional measures of hearing, as well as perceived hearing loss, does appear to have a relationship to the average lowest detectable sounds (0 dB HL) and
Some Observations on ‘Normal’ Hearing and Hearing Loss

the range we define encompassing normal pure-tone audiometry.

An agreed-upon clinical definition for normal pure-tone audiometry is important. Based on the literature, statistics, and professional organization recommendations, 15 dB HL seems to be a fairly well-supported clinical cutoff. This cutoff should be considered for the counseling and management of audiometric evidence of hearing thresholds outside the normative range. Further, this appears to be a reasonable cutoff for epidemiological and case-control studies for defining pure-tone hearing within normal limits versus hearing loss.

Christopher Spankovich, AuD, PhD, is an associate professor, director of clinical research, and clinical audiologist at the University of Mississippi in Jackson, Mississippi.

References


Some Observations on ‘Normal’ Hearing and Hearing Loss


October Is
NATIONAL
AUDIOLOGY
AWARENESS
MONTH

MARK YOUR CALENDAR...

SEPTEMBER
Newborn Hearing Screening Awareness Month
Balance Awareness Week (September 13–19)
Falls Prevention Day (September 22)

OCTOBER
National Health Education Week
(October 19–23)

NOVEMBER
Alzheimer’s Disease Awareness Month
Diabetes Awareness Month

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Cognitive-Screening Practices Among Audiologists

BY SARAH BLACK AND PAMELA SOUZA
This survey, designed to study the way audiologists are attending to cognitive decline in their patients, illustrates a need to increase professional development opportunities and develop clear referral pathways regarding cognitive decline.

Cognition (i.e., the ability to reason, plan, remember, and direct tasks) has gained our professional attention, motivated in part by findings that hearing loss is associated with greater likelihood of cognitive decline (Lin et al, 2011; Lin et al, 2013) and is a major modifiable factor contributing to dementia risk (Livingston et al, 2017). Providers within and outside audiology have asserted that screening and awareness of cognitive decline is within our scope of practice and should be part of treatment decisions (Valente et al, 2006; Remensnyder, 2012; Maslow and Fortinsky, 2018). Understanding how an individual’s cognitive ability affects communication is also consistent with providing whole patient care (Taylor and Weinstein, 2015).
The goal of cognitive screening is to identify patients who may have mild cognitive impairment (MCI), a modest cognitive decline from previous performance that does not interfere with independence in everyday activities, or dementia, a severe decline that interferes with independence (American Psychiatric Association, 2013).

Several paths are open to providers, including making referrals for further evaluation when patients, family members, or the providers themselves note cognitive concerns during clinical care and/or formal screening whereby the need for referral can be determined in a quantitative way. Such practices are in widespread use in primary care (Alzheimer’s Association, 2019; Raymond et al, 2020), but less common among audiologists (Martin et al, 2018). This article describes the results of a survey created to gain insight into how audiologists are responding to cognitive concerns in their patients.

**Methodology**

A 21-question survey was developed using Qualtrics software. The survey and study methodology...
were reviewed by the local institutional review board and determined to be exempt research. The questions addressed three areas: cognitive screening practice, professional knowledge regarding cognitive issues, and recommendation and referral. The survey link was distributed to 9,700 audiologists via a professional listserv (Audiologist Resources Inc.) and completed by 1,104 audiologists, for a response rate of 11 percent.

Results

The respondents represented a range of practice settings (FIGURE 1). Among respondents, 82 percent reported having an AuD, 12 percent reported a master’s degree, and 6 percent reported a PhD. All responses were anonymous and respondents were not compensated for their time.

COGNITIVE SCREENING

Most respondents (88 percent) reported that they do not administer formal cognitive screening, although this varied widely by practice setting (TABLE 1). Across all respondents, the most common reasons given for not screening were: not being comfortable administering screening questionnaires (19.8 percent), not having time (19 percent), or that such screening was not in the audiologist’s scope of practice (10 percent).

Among audiologists who use screening instruments, the most commonly reported screeners were the Mini-Mental State Exam.

<table>
<thead>
<tr>
<th>PRACTICE TYPE</th>
<th>PERCENTAGE ADMINISTERING COGNITIVE SCREENING</th>
</tr>
</thead>
<tbody>
<tr>
<td>College or university</td>
<td>29.6%</td>
</tr>
<tr>
<td>Nonprofit clinic</td>
<td>23.1%</td>
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<tr>
<td>Hearing aid manufacturer</td>
<td>17.4%</td>
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<tr>
<td>Audiology private practice</td>
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<tr>
<td>Hospital/medical center</td>
<td>7.9%</td>
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<tr>
<td>Veterans Administration or military</td>
<td>7.5%</td>
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<tr>
<td>Physician’s office</td>
<td>5.6%</td>
</tr>
<tr>
<td>Franchise or retail chain</td>
<td>4.2%</td>
</tr>
<tr>
<td>Primary or secondary school</td>
<td>0.0%</td>
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</table>
Cognitive-Screening Practices Among Audiologists

(MMSE) (Folstein et al, 1975) and Montreal Cognitive Assessment (MoCA) (Nasreddine et al, 2005) (TABLE 2).

PROFESSIONAL KNOWLEDGE REGARDING COGNITIVE ISSUES

Across all respondents, 80 percent reported they had received training to distinguish age-typical from abnormal cognition and 41 percent reported they had received training to administer cognitive screeners. The type of training varied according to length of professional experience (FIGURE 2). Audiologists who received their clinical degree more recently were more likely to report receiving such training as part of their graduate program.

REFERRALS AND RECOMMENDATIONS

When there are concerns about cognitive ability, the majority of audiologists (70 percent) refer patients for further evaluation. Of those, most (42 percent) refer to the patient’s primary care physician and, less commonly, to other specialty providers including neurologists (19 percent), psychologists (12 percent), otorhinolaryngologists (10 percent), and geriatricians (9 percent).

One-third of survey respondents also recommend patients use at-home training tools. The most common specific recommendations were the Listening and Communication Enhancement program (LACE) (70 percent) and Lumosity Brain Training (26 percent).

Discussion

The study results indicate several themes. Consistent with calls by professional leaders for increased attention to cognitive ability, there were signs that training opportunities are increasing.

For example, the number of audiologists who reported they

<table>
<thead>
<tr>
<th>SCREENING INSTRUMENT</th>
<th>PERCENTAGE USING THE SCREENING INSTRUMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mini-Mental State Exam (MMSE)</td>
<td>42.3%</td>
</tr>
<tr>
<td>Montreal Cognitive Assessment (MoCA)</td>
<td>38.2%</td>
</tr>
<tr>
<td>Clock-Drawing Test</td>
<td>17.1%</td>
</tr>
<tr>
<td>Mini-Cog Test</td>
<td>16.3%</td>
</tr>
<tr>
<td>Three-Word Recall Test</td>
<td>13.8%</td>
</tr>
<tr>
<td>Six-Item Cognitive Impairment Test (6CIT)</td>
<td>10.6%</td>
</tr>
</tbody>
</table>
were trained to perform cognitive screening during their graduate education has more than doubled within the past 10 years. Of those entering practice in the past five years, 44 percent reported such training, compared to 20 percent of those entering practice in the previous five years.

With regard to how many audiologists conduct cognitive screening using validated assessments, previous surveys of up to a few hundred audiologists have reported values from 5 to 25 percent (Anderson et al, 2018; Martin et al, 2018; Raymond et al, 2020). The present data from a larger sample suggest that the range may vary by type of practice; specifically, as shown in TABLE 1, clinics with more time per appointment or greater flexibility in their appointment structure, such as college, university, and nonprofit clinics, have incorporated screening to a greater extent.

For audiologists who conduct cognitive screening, a screening instrument that is sensitive to
Cognitive-Screening Practices Among Audiologists

MCI is likely to be a high priority. MCI is more prevalent than dementia among older adults, affecting up to one in five adults over 65 years of age (Langa and Levine, 2014). Most adults with MCI continue to function independently and are less likely to have come to the attention of their other health providers (Mitchell et al, 2011; Nogueras et al, 2016). Therefore, older audiology patients may present to audiologists with undiagnosed MCI.

Forty-two percent of audiologists (Raymond et al, 2020) and 80 percent of physicians (Alzheimer’s Association, 2019) reported screening with the MMSE. While this measure may be familiar to providers, recent work suggests that it is less sensitive to MCI than other instruments (Breton et al, 2019). Screening instruments with higher sensitivity to MCI include the MoCA and the St. Louis University Mental Status Examination (SLUMS), each of which takes less than 15 minutes to administer.

Even if formal screening is not conducted, most clinicians (70 percent) reported referring when history or interactions with the patient present a concern for cognitive decline. Most commonly, this referral is to primary care.

An interesting segment is made up of audiologists who reported they do not refer for cognitive concerns—30 percent in the present study and 39 percent in Raymond et al (2020). These surveys are not informative on reasons for non-referral, but the possible reasons could include discomfort discussing cognitive symptoms or screening results (Martin et al, 2018; Clark and English, 2019) or uncertainty as to the appropriate referral pathway (Martin et al, 2018).

Next Steps

The results of this survey suggest several opportunities for incorporating cognitive screening into audiology practice. Free, quick, validated screening instruments are available and an increasing number of in-person and online continuing education options provide training for those instruments.

There is also a need to develop referral pathways so that patients identified with possible cognitive decline (whether via screening or observation) can obtain the necessary follow-up.

Training clinicians to counsel patients regarding cognition can support patient care, as well as the role of cognition in everyday communication.
Cognitive-Screening Practices Among Audiologists

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Acknowledgments

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References


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Simple Tips to Ventilate Your Audiometric Booth

By Adam Dawson

COVID-19 has created much uncertainty about how the world will change. One area of concern for hearing-care professionals is the audiometric booth. In addition to door handles and surfaces potentially being contaminated, the air in the room can also be compromised if measures to ensure effective ventilation aren’t taken.

Ventilation depends on the type of booth you have. Eckel recommends that ventilation in their booths be kept at a lower volume. Typical Eckel sound rooms are equipped with low-volume, fan-powered air-handling systems that are capable of 10 to 12 air exchanges per hour. For Eckel booths hooked up to an HVAC system, it’s recommended that the air-handling system should be balanced for no more than 80 to 100 cfm to maintain the acoustic integrity of the room, as well as the air-exchange rate.

As for ETS-Lindgren audiometric booths, the following recommendations apply:

1. Newer booths with variable speed fans
   - When testing, adjust fan for 6 to 8 air changes per hour
   - When not testing, the airflow can be adjusted up to 148 cfm

2. Older booths with integrated muffin fans
   - 45 cfm per fan—most booths have 2 fans

3. Booths connected to building HVAC
   - Recommendation is 6 to 8 air changes per hour
   - An airflow hood is needed to measure actual air flow

For more audiometric booth ventilation tips, read the full article today! http://blog.e3diagnostics.com/all-about-audiometric-test-booth-ventilation

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Adam Dawson is the digital marketing coordinator for e3 Diagnostics in Arlington Heights, Illinois.

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In the era of COVID-19, it has become increasingly important to use different methods of clinical service provision to protect our patients’ health while still addressing their hearing, tinnitus, and vestibular health-care needs.

As audiology clinics increase their use of telehealth as a method for patient care, audiologists must understand how such changes also impact coding and billing. This article will discuss considerations and provide examples of billing and coding for telehealth services for audiologists.

Insurance coverage for telehealth services varies based on payer. It is unlikely that payers will cover a service delivered through telehealth if it was not already recognized as a covered service. In other words, non-covered services will remain non-covered if provided via telehealth. For specific or atypical situations, it is recommended that professionals contact the payer directly to obtain guidance on coding and billing for services provided via telehealth.

**Telehealth Place-of-Service Codes and Modifiers**

Health-care claim forms will typically have a space to indicate where the service took place. On the Centers for Medicare and Medicaid Services (CMS) 1500 health-care claim form, the place of service designation is reported in Box 24.b.

**TABLE 1** provides the place-of-service designations most pertinent to audiologists.

- **Place-of-service code 11**—Office is primarily used for typical face-to-face procedures provided in audiology offices.

- **Place-of-service code 02**—Telehealth indicates that the services were provided through a telecommunication system.
Some payers may use modifiers to indicate services were provided via telehealth. The only modifiers applicable for audiology services are Modifiers -95 (Telehealth) and -GT (Telehealth).

On April 3, 2020, CMS provided guidance on appropriate reporting of telehealth services during the public health emergency (see Resources, CMS Guidance, Billing for Telehealth Services). Per CMS guidance, covered telehealth services should be reported using the appropriate procedure and diagnosis code(s), the normal in-person place of service (e.g., 11—Office), and the Modifier -95 to indicate the service was performed via telehealth. The Modifier -GT should only be reported when specifically instructed by the payer.

### Telehealth Codes

CMS approved the reporting of certain telehealth codes during the COVID-19 pandemic for certain practitioners who cannot bill Evaluation and Management (E/M) codes. These telehealth codes are presented in TABLE 2 (adapted from Resources on page 62: American Medical Association (AMA)). Readers should note that the codes provided in TABLE 2 may not be covered by Medicare or other payers when billed by audiologists. Audiologists are strongly encouraged to check with payer-specific guidance prior to reporting these codes.

### Medicare

Because covered audiology services through Medicare Part B are currently limited to diagnostic procedures, examples of telehealth services covered under Medicare for hearing and balance care are few. A list of audiology services covered through Medicare is provided elsewhere (see Resources on page 62: CMS Guidance, Audiology Code List). TABLE 3 presents the current procedural terminology (CPT) codes that have been approved for telehealth provision as of May 1, 2020 (American Academy of Audiology (Academy), May 1, 2020).

For Medicare services that are never covered when provided by an audiologist, a voluntary Advance Beneficiary Notice (ABN) may be issued, but it is not required. More information regarding use of the ABN in audiology is provided in the Resources.

### TABLE 1. Commonly Used Place-of-Service Designations in Audiology

<table>
<thead>
<tr>
<th>PLACE OF SERVICE</th>
<th>NAME</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code 11</td>
<td>Office</td>
<td>Location, other than a hospital, skilled nursing facility, military facility, community health center, or state or local public health clinic where assessment, diagnosis, and treatment occurs on an ambulatory basis</td>
</tr>
<tr>
<td>Code 02</td>
<td>Telehealth</td>
<td>Location where services are provided through a telecommunication system</td>
</tr>
</tbody>
</table>
section (see Resources on page 62: Academy, ABN Quick Reference Guide). If the claim must be submitted to Medicare for denial, the GY or GY/GX modifier(s) would apply.

**Insurers Other than Medicare**

Insurance coverage policies for Medicaid, the Children's Health Insurance Program (CHIP), Medicare Advantage, and commercial insurance are discussed elsewhere (see Resources on page 61: Academy, COVID-19 Academy Resources). Practitioners are encouraged to seek telehealth coding and billing guidance directly from payers’ policy bulletins and websites. Clinicians should also reference payer-specific

<table>
<thead>
<tr>
<th>METHOD OF PATIENT INTERACTION</th>
<th>QUALIFYING CHARACTERISTICS</th>
<th>APPLICABLE PROCEDURE CODES (CHOOSE ONE)</th>
<th>ADDITIONAL CONSIDERATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nonphysician Telephone Services</td>
<td>1. Non-face-to-face assessment/management provided over the telephone</td>
<td>98966 (5–10 min) 98967 (11–20 min) 98968 (21–30 min)</td>
<td>Applicable ICD-10 Codes  • Choose code(s) to describe the reason for the encounter.  • Consider encounter codes (e.g., Z46.1, Z45.32, Z97.4). Place of Service  • 11—Office or other normal office location</td>
</tr>
<tr>
<td>2. New or established patients</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Not related to episode of care within the last seven days</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Not billed if telephone service results in decision to see the patient within 24 hours or soonest available appointment</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nonphysician Online Digital Evaluation and Management (E/M) Services</td>
<td>1. Patient-initiated through the electronic health record (EHR) portal, secure email, etc.</td>
<td>98970/G2061* (5–10 min) 98971/G2062* (11–20 min) 98972/G2063* (21+ min)</td>
<td></td>
</tr>
<tr>
<td>2. New or established patients</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Require evaluation to inform management of the patient (mandatory E/M component)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Billed once for cumulative time devoted during a seven-day period</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Documentation and permanent storage of encounter required</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*G codes are exclusive to CMS; however, CMS does not cover G codes when provided by an audiologist; use the GY modifier. Other codes (i.e., 98970, 98971, 98972) are recommended for use among other payers.

**Practitioners are strongly encouraged to contact payers to determine whether reporting of these codes by audiologists is appropriate.
information when determining if a notice of non-coverage is necessary for services provided via telehealth.

**Services Not Covered (Self-Pay)**
When insurers do not provide coverage, audiologists can furnish services remotely or via telehealth, as permitted through state licensure laws. As with other health-care goods or services not covered by the payer, these services can be paid directly by the patient. If the service is not covered by a third-party payer, audiologists would apply policies and customary fees they would normally use for a similar face-to-face, self-pay transaction.

**Considerations for Practitioners and Case Examples**
A decision matrix for audiology telehealth services is presented in FIGURE 1. This tool outlines general considerations when billing patients for audiology telehealth services: (1) Would there typically be a charge for the service if provided in the office? (2) Would we typically be reimbursed for providing that service by a third-party payer? Or, would this charge be the patient’s responsibility? Below we will discuss three case examples pertaining to audiology services provided using telehealth.

**Case Example 1**
A long-standing patient was scheduled for a binaural hearing aid check (92593) prior to the public health emergency. The hearing

<table>
<thead>
<tr>
<th>CPT CODE</th>
<th>DESCRIPTION</th>
<th>ADDITIONAL CONSIDERATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>92601</td>
<td>Diagnostic analysis of CI, patient &lt;7y, initial programming</td>
<td>If billing for procedures under non-facility rates, report regular in-person place of service (e.g., 11-office) and Modifier -95 (telehealth) unless instructed otherwise by payer.</td>
</tr>
<tr>
<td>92602</td>
<td>Diagnostic analysis of CI, patient &lt;7y, subsequent reprogramming</td>
<td></td>
</tr>
<tr>
<td>92603</td>
<td>Diagnostic analysis of CI, patient ≥7y, initial programming</td>
<td></td>
</tr>
<tr>
<td>92604</td>
<td>Diagnostic analysis of CI, patient ≥7y, subsequent reprogramming</td>
<td></td>
</tr>
</tbody>
</table>

**TABLE 3. List of CPT Codes Added for Telehealth Provision (effective May 1, 2020)**
CODING AND REIMBURSEMENT

Case Example 1
A patient had already been fitted with hearing aids and was scheduled to come in for a follow-up hearing aid check and reprogramming. Due to the public health emergency, they were unable to come into the office. Instead, this appointment was conducted remotely using a telecommunications system. Hearing aid checks and related services are included in the purchase price of the hearing aids, meaning, there is typically no charge for this appointment.

Because the clinic does not charge a fee for this appointment, we would perform the procedure as usual, but would not bill the patient for the service.

Case Example 2
A patient was fitted with two hearing aids and was scheduled for a follow-up visit. Due to the public health emergency, they were unable to come into the office. Instead, the visit was conducted remotely and consisted of a binaural hearing aid check (92593). There is typically a fee for this service when provided in the office.

The patient is a Medicare beneficiary without a secondary insurance.

Because there is a customary fee for this service when provided in the office, we would also apply a fee for comparable services when provided through telehealth. Since the patient’s insurance, Medicare, does not include hearing aid services under covered services, we seek payment directly from the patient for the usual and customary fee of the 92593 service.

Case Example 3
An adult cochlear implant patient was seen for an initial programming session. Due to the public health emergency, the programming session was conducted by the audiologist via telehealth (synchronous audio and video) and use of remote-programming software. There is typically a fee for this service when provided...
in a face-to-face transaction. The patient is a Medicare beneficiary.

Because there is a customary fee for this service when provided in the office, we would also apply a fee for comparable services when provided through telehealth. Since the patient’s insurer, Medicare, covers cochlear implant programming codes when provided by audiologists via telehealth, we would choose the appropriate procedure code (here, 92603—Diagnostic Analysis of Cochlear Implant, seven years and older, initial programming) and diagnosis code(s). We would then use the -11 Office place-of-service designation and the Modifier -95 (Telehealth) to indicate that the service was provided remotely.

Conclusion
It is likely that the telehealth delivery model will remain even after the COVID-19 pandemic. As audiologists consider expanding their delivery model to include telehealth, there are many resources available for navigating coding and billing for these services. Updates and guidance from the Academy will be posted to the Academy’s website.

We encourage members to contact the American Academy of Audiology Coding and Reimbursement Committee at reimbursement@audiology.org with questions regarding the provision of audiology services via telehealth.

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Erin L Miller, AuD, is a professor of instruction at the University of Akron and coordinator of the Northeast Ohio AuD Consortium.

Dr. Chakrabarty and Dr. Jilla are members of the Academy’s Coding and Reimbursement Committee and Dr. Miller is a member of the Academy’s Practice Policy Advisory Council.

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Resources

American Academy of Audiology (Academy)
COVID-19: Academy Resources
www.audiology.org/practice-management/covid-19/covid-19-resources

Advance Beneficiary Notice (ABN) Quick Reference Guide
CODING AND REIMBURSEMENT

Telehealth and Telemedicine
www.audiology.org/practice_management/resources/introduction-telemedicine

American Medical Association (AMA)
Telehealth Coding Scenarios (see Scenario 8 for Practitioners Who Cannot Bill E/M)

CMS Guidance
Audiology Services
www.cms.gov/Medicare/Medicare-Fee-for-Service-Payment/PhysicianFeeSched/Audiology

Audiology Code List (revised 2016)
www.cms.gov/Medicare/Billing/TherapyServices/Downloads/Audiology_Codes.pdf

Billing for Professional Telehealth Services During the Public Health Emergency (April 3, 2020)
www.cms.gov/outreach-and-education/outreachffsprovpartprogp rovider-partnership-email-archive/2020-04-03-minc-se

CMS Telehealth Resources
Notification of Enforcement Discretion for Telehealth Remote Communications During the COVID-19 Nationwide Public Health Emergency (March 30, 2020)
www.hhs.gov/hipaa/for-professionals/special-topics/emergency-preparedness/notification-enforcement-discretion-telehealth/index.html

Medicare Telehealth Coverage
www.medicare.gov/coverage/telehealth

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- **Esosera**
  - [www.EARcareMD.com/audiology](http://www.EARcareMD.com/audiology)

- **FrontRow Calypso LLC**
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- **Interacoustics US**
  - [www.interacoustics.com/](http://www.interacoustics.com/)

- **Oticon, Inc.**
  - [oticon.com/fitting](http://oticon.com/fitting)

- **Prestige Brands, Inc.**
  - [www.debrox.com](http://www.debrox.com)

- **SHOEBOX**
  - [www.shoeboxonline.com](http://www.shoeboxonline.com)

- **Signia**
  - [pro.signiausa.com](http://pro.signiausa.com)

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** Gordey & Rumley, 2019, Oticon Whitepaper
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