Public Health in Audiology

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Expand your awareness of public health and learn examples of public health domains in audiology that may suggest how we as a profession can improve our "public health footprint."

What do you think of when you hear the term *public health*? Maybe you think of HIV/AIDS, vaccines, Medicare, the CDC, or even the movie *Outbreak!* What if I asked you about public health in audiology? Perhaps you think of newborn hearing screenings, occupational noise standards, and direct access.

Public health surrounds us; it does not fall neatly into any category but does have principles that can serve to better audiology, and for audiology to better serve the hearing and balance needs of the public. The purpose of this article is to expand your awareness of public health, to offer examples of public health domains in audiology, and to suggest how we as a profession can improve our "public health footprint."

The Institute of Medicine (IOM) in its 1988 report *The Future of Public Health* defined *public health* as "the fulfillment of society's interest in assuring the conditions in which people can be healthy." This definition was intentionally broad, as to capture the expanding substance and emphasis from early focus on sanitary measures to contemporary multidimensional health promotion. The drawback of such a broad definition is loss of distinctive meaning. The IOM goes on to discuss a more restricted definition of public health as "a coalition of professions united by a shared mission; with focus on disease prevention and health promotion; using a prospective approach in contrast to a reactive focus of medicine (and audiology); and founded in the common science—epidemiology (IOM, 1988)." *The interested reader is encouraged to*

review the entire report "The Future of Public Health" for a more in-depth exploration of this topic.

The edifice of public health is exemplified by the common infrastructure shared among schools of public health. I reviewed the curriculum of three top schools of public health in the United States, according to *U.S. News & World Report*: Johns Hopkins University, Harvard University, and UNC-Chapel Hill. Schools of Public Health are typically divided into departments with tracks of specific emphasis. These generally include some variation of behavioral science and health education, biostatistics, epidemiology, environmental and occupational health, health policy and management, and international/global health.

Behavioral Science and Health Education

Behavioral science and health education (BSHE) is a track of public health founded on the principles of psychology and health behavior theory. This area of study has broad implications for public health, including development of theory-based health interventions. Health theories are abundant and may apply to interpersonal (i.e., how one's knowledge, attitudes, beliefs, and other traits affect behavior), intrapersonal (i.e., how our interactions with others, social identity, and normative expectations affect our behaviors), community-based (i.e., how regulations and policies can affect health behavior), and/or a combination of these relationships (as reviewed by Sobel and Meikle, 2008).

Principles from BSHE can provide us with the foundations to develop appropriate targeted interventions with measureable outcomes. An example of a successful application of BSHE in audiology is the Dangerous Decibels® campaign. This is an intervention targeted at children and adolescents to increase hearing conservation practices. This program was founded in a health behavior theory (in this case Theory of Reasoned Action), developed an intervention based on identified needs, and has ongoing evaluation of outcomes based on that theory (for more information see Griest et al, 2007). Other campaigns directed at children and teens exist related to noise and hearing conservation (Turn It to the Left®, Listen to Your Buds®, and Noisy Planet® to name a few), but how about other populations?

So much more needs to be done to improve hearing "public health" behaviors! For example, where are theory-based interventions for hearing conservation practices among young adults? How about older adults and prevention of falls? How can public health principles be applied in the diffusion of innovations such as hearing aids and tinnitus treatment? The literature suggests that we tend to stop at the point of looking at knowledge, attitudes, behaviors, and other traits without actually taking the next step of developing programs founded upon recognized theories with measurable outcomes. Hearing loss and dizziness are two of the top health conditions facing older adults, yet where are our public service announcement (PSA) campaigns, such as "Only You Can Prevent Hearing Loss," "Hearing Is a Terrible Thing to Waste," This Is Your Cochlea…This is Your Cochlea on Noise…Any Questions," "You Could Learn a Lot from a KEMAR," "Give a Hoot….Wear Hearing Protection" (okay maybe the last two are stretch).

Biostatistics

Biostatistics is the science of obtaining, analyzing, and interpreting data. If you are in academia you likely have an appointed biostatistician (formally or self-educated) you run to for questions on data analysis. Can I use the standard error of the mean instead of the standard deviation? Biostatistics is not unique to public health but is a critical component in analyzing and interpreting public health outcomes. The other areas of interest discussed here are highly dependent on our friendly neighborhood biostatisticians.

Epidemiology

Epidemiology is the discipline focused on methods to understand patterns and causes of health and disease; it is considered the "mother science" of public health (IOM, 1988). Almost every day you can find an article online concerning an epidemiological study showing some relationship such as "dark chocolate reduces risk of heart disease" or "second-hand smoke increases risk of hearing loss." Biostatistics and epidemiology have long been a part of hearing and balance research. However, in many instances of our literature, epidemiological studies are cross-sectional in a representative population and may only consider reported hearing loss or may be limited to a pure tone average (250–4000 Hz). Don't we hear above 4000 Hz?

Larger multi-institutional longitudinal studies are needed to further understand diseases, genetics, dietary factors, and other variables involved in susceptibility to hearing loss and balance disorders. Audiologists need to be more involved in and contribute more to these areas. Knowledge of factors that influence population susceptibility to hearing and balance function enable the field to strategically plan for future research needs.

Health Policy and Management

Health policy and management is the track of public health that generates policy, standards, and regulations based on the outcomes of our research (well, hopefully). Audiology is already involved in a number of these issues including universal newborn hearing screening, noise standards and regulations, direct access to audiology, hearing aid tax, and others. Changes at this level can be more difficult to implement and are dependent on outcomes founded in theory and good science. The better the evidence, the stronger the support for updating regulations and policy. However, this step goes beyond the creation of policy and ultimately comes down to the health behavior of interest. For example, there are a number of occupational health standards and guidelines set forth by separate organizations (OSHA, NIOSH, etc.) for occupational noise exposure. But how well are they enforced? How often have you seen your luggage loading onto an airplane with a ground crew worker wearing brightly colored ear protection around their neck and not in their ears? Do we just blame the workers for insubordination? Or, do we try to develop a solution, perhaps with principles from BSHE?

Environmental and Occupational Health

Environmental and occupational health is fairly self-descriptive. Many environmental and work-related factors can affect our health. As audiologists, we are well aware of this. Noise, chemicals, drugs, and a host of other factors in our everyday environment and workplaces can increase risk for hearing loss and/or balance disorders. This influence of the environment and workplace on our hearing and balance incorporates principles and components from all areas of public health, as exemplified in the ground crew worker case above.

International/Global Health

International/global health expands public health beyond domestic concerns and takes into consideration global implications. Hearing loss is not only a leading public health concern in the United States but in both developed and undeveloped countries around the world. For example, let's talk about multiple-drug resistant tuberculosis (MDR-TB). In the United States, the prevalence of MDR-TB is low, approximately 0.6 percent of all U.S.-born patients with TB (LoBue et al, 2010). In Eastern Europe, Asia, and Africa these numbers are much higher, in some areas over 30 percent of all TB cases being drug-resistant (Migliori et al, 2010). What does this have to do with audiology? One of the common treatments for MDR-TB is aminoglycoside drugs (Carminero et al, 2010). Aminoglycosides have well known ototoxic properties. Risk to hearing is exacerbated in countries with high rates of MDR-TB, minimal controls on dosing, and lack of audiological monitoring.

You and Public Health

Each of these disciplines represents a piece of public health. The final public health piece is you, the healthcare professionals on the front line or the researcher in the lab. I hope by reading this you are now thinking about how we audiologists, as a profession, can deepen our public health footprint. Our efforts may include improving interventions by using relevant health theories, enhancing epidemiological studies with

stronger methods, progressing policy and regulations with evidence-based outcomes, and considering global implications of hearing and balance health. These public health principles are applicable to audiology as a profession acting mot only globally, but also locally at the level of the individual audiologist. How can you improve the hearing health of your individual patients as well as your community?

This is your cochlea...This is your cochlea on noise... Any questions?

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