Basic Information on Hearing Health

Information and Recommendations for Faculty and Staff in Schools of Music

National **A**ssociation of **S**chools of **M**usic
Performing **A**rts **M**edicine **A**ssociation

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Introduction

The National Association of Schools of Music (NASM) and the Performing Arts Medicine Association (PAMA) have developed a comprehensive overview of hearing health issues for postsecondary schools and departments of music.

This document provides a comprehensive overview for music faculty and staff.

It is oriented toward issues of hearing health in the context of a school or department of music.

Information of a medical nature is provided by PAMA; information regarding contextual issues in music programs, by NASM.

Please note: Information in this Web resource is subject to change at any time without prior notice.

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Fast Tracks

1. Organizations

NASM, founded in 1924, is an organization of schools, conservatories, colleges and universities with approximately 630 accredited institutional members. It establishes national standards for undergraduate and graduate degrees and other credentials and is the national music accrediting agency. NASM also provides information to potential students and parents, consultations, statistical information, professional development; and policy analysis.

PAMA, founded in 1989, is an organization comprised of dedicated medical professionals, artists, educators, and administrators with the common goal of improving the health care of the performing artist. Members of PAMA are professionals in fields that include research, education, and clinical practice who hail from all corners of the globe.

2. Disclaimers

a. NASM and PAMA are providing this web resource for institutions that teach music to assist local consideration and action about hearing health.

b. The information:

- is generic, presentational, and advisory in character.
- is oriented far more to musicians and lay persons than to medical, scientific, or research professionals concerned with hearing health.
- does not substitute for the professional judgments of medical and other professionals working in their areas of documented expertise.
- is not to be considered as professional advice or to be used as a basis for the medical treatment of specific individuals.
- does not supersede present and future empirical research that may confirm, contradict, expand, or change the medical or other information provided here at any point in time.
- in no way serves as the basis for the accreditation function of NASM or as an addition to the accreditation standards and procedures of NASM. (A *Handbook* containing standards and a set of *Membership Procedures* are published separately by NASM.)
- is not an endorsement of the reference materials listed or cited; nor does it represent an endorsement of other opinions, methods, or approaches described in the text.

c. Health and safety depend in large part on the personal decisions of informed individuals. Institutions have health and safety responsibilities, but fulfillment of these responsibilities can and will not ensure any specific individual's health and safety. Too many factors beyond any institution's control are involved. Individuals have a critically important role and each is personally responsible for avoiding risk and preventing injuries to themselves before, during, and after study or employment at any institution. This set of advisory information on hearing health and institutional actions taken under their influence or independently do not alter or cancel any individual's personal responsibility, or in any way shift personal responsibility for the results of any individual's personal decisions in any instance or over time to any institution, or to NASM, or to PAMA.

3. Acknowledgements

NASM and PAMA acknowledge with gratitude the efforts of the many past and present professionals in various medical, research, and music-related fields who developed the scientific and practical information summarized in this set of resources. They express appreciation to the members of PAMA, NASM, and the American Academy of Audiology who made comments and suggestions on drafts of this and other documents in this Web resource.

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Part I. Hearing Health Facts and Concepts

Hearing Health: The Basic Issue

Hearing health is important for everyone. It is critical for music professionals.

Certain types of hearing loss, such as those caused by genetic factors, infections, or head trauma are often unavoidable and sometimes only temporary.

One particular type of hearing loss is often permanent: hearing loss due to noise exposure.

Scientifically, this is referred to as noise-induced hearing loss or NIHL.

The hearing system can be injured not only by a loud blast or explosion but also by prolonged exposure to high decibel levels of sound.

Music of any type and source at high volume that exceeds daily exposure levels and time periods is dangerous to hearing. Over time, NIHL can be the result.

Preventative measures need to be taken by individual musicians and by institutions where musicians study and work.

Preventative measures include but are not limited to information, applications of information in decision-making and culture building, and acoustically appropriate performance and rehearsal spaces.

The issue is serious. NIHL is widespread. Statistics vary, but 50 percent of musicians may have problems with hearing loss to some degree.

The danger of noise-induced hearing loss is calculated on the basis of scientific evidence expressed mathematically and in other scientific languages. Individual perceptions about loudness may provide useful indications; however, such perceptions are not a substitute for assessments based on scientific measurement and evidence-based data.

Purpose of this Web Resource

This web resource is focused on hearing health and hearing loss, preventative measures, and how schools and departments of music can work appropriately and comprehensively with associated issues.

This information is to be used in service of a goal in individual institutions to provide conditions that support hearing health.

The first essential is information about hearing health, hearing loss, and preventative action.

Without knowledge of what can happen and how to minimize risk, music students and professionals have little basis for making informed decisions to care for their hearing and that of other musicians with whom they work.

For each school or department of music, hearing health is addressed in a multi-faceted context.

Charting an effective course to promote and provide the best environment for hearing health means working with many issues and forces beyond providing information for students, faculty, and administrators.

To be successful, a comprehensive hearing health program needs to be sustained from year to year.

This resource provides the basis for instructional efforts to provide information and develop a plan for supporting hearing health with a particular focus on minimizing conditions that could contribute to noise-induced hearing loss.

Basic Facts

Music, Noise, and Loudness Levels

Music is not noise, at least not to musicians.

So why are we talking about **noise-induced Hearing Loss** in a music setting?

How are music, noise, and hearing health connected?

Authoritative information about hearing health comes from medical research and practice. Both are based in science where “noise” is a general term for sound.

Music is one kind of sound among thousands of others.

Don’t be confused or offended by terms. Remember the fundamental point.

A sound that is too loud, or too loud for too long, is dangerous to hearing health, no matter what kind of sound it is or whether the sound is called noise, music, or something else.

Sounds below threshold danger levels produce no risk, no matter how long the exposure time.

Music itself is not the issue. Loudness and its duration are the issues, for music and for all other sound sources.

Decisions about music play an important part in hearing health, but hearing health can be affected by far more sound sources than music. Loud sounds from all sources contribute 24/7 to the daily exposure level.

Musicians are responsible for their art form, and for supporting the well-being of other musicians.

Cultivating the most positive personal and professional relationship between music and hearing health is part of that responsibility.

Like so many issues in music itself, optimum effectiveness depends on balanced applications of knowledge and skill in varying circumstances by thousands of individual student, professional, and amateur musicians day after day.

Noise-Induced Permanent Hearing Loss

The Path of Hearing

Sound enters the outer ear in the form of sound waves. These waves travel through the bones of the middle ear. When they arrive in the inner ear, they are converted into electrical signals which travel via neural passages to the brain. It is then that sound is “heard.”

Middle Ear Damage

Occasionally, the intensity of a very loud impulse noise, like an explosion, can perforate the eardrum or dislodge the miniature bones of the middle ear, causing a conductive hearing loss. In many cases, this damage can be repaired with microsurgery. But such loud noise levels are also likely to send excessive sound levels into the inner ear, where permanent sensorineural hearing damage occurs.

Inner Ear Damage

After a sound passes through the middle ear, it enters the inner ear, also known as the cochlea. Inside the cochlea are tiny hair cells that help transmit sound waves to the brain. Loud noises cause damage to the hair cells, impairing their ability to send neural impulses to the brain.

Severity of Loss

The severity of an individual’s noise-induced hearing loss depends on the severity of this damage to the hair cells of the inner ear.

Severity of damage to these hair cells is normally related to the length and frequency of exposure to loud sounds over long periods of time.

It is important to understand that hair cells do not regenerate and that once hair cells are damaged, they cannot be repaired.

Noise-induced hearing loss is permanent and painless and initially reduces hearing sensitivity for high frequency sounds. If additional noise exposures continue, the damage progresses to greater hearing loss for sounds that are important for speech understanding, as well as music perception.

Noise-Induced Temporary Hearing Loss

Sometimes, after continuous, prolonged exposure to loud noise, an individual may experience temporary hearing loss. During temporary hearing loss, known as Temporary Threshold Shift (TTS), a person's hearing ability is reduced. Outside noises may sound fuzzy or muted. Normally, this reduction lasts no more than 16 to 18 hours, after which normal hearing levels are restored.

Often during TTS, individuals will experience tinnitus, a medical condition characterized by a ringing, buzzing, or roaring in the ears. Tinnitus may last only a few minutes, but it can also span several hours, or, in extreme instances, last indefinitely.

A series of temporary hearing losses may be a precursor to permanent damage.

Temporary noise-induced hearing loss is reversible with adequate rest and recovery.

Noise Levels and Risk

Prolonged exposure to any noise or sound over 85 decibels can cause hearing loss. A decibel, defined by Merriam-Webster as "a unit for expressing the relative intensity of sounds on a scale from 0 for the average least perceptible sound to about 130 for the average pain level" is abbreviated "dB."

The longer one's exposure to a loud noise, the greater the potential for hearing loss.

The closer a person is to the source of a loud noise, the greater the risk for damage to the hearing mechanisms.

Consider these common sounds and their corresponding decibel levels:

30 dB – A Whisper

50 dB – Moderate Rain

60 dB – The Average Conversation

70 dB – Passing Freeway Traffic

80 dB – Alarm Clock

90 dB – Blender, Food Processer, Blow-Dryer; The Subway

100 dB - MP3 Players at Full Volume; Lawnmower, Snowblower

110 dB – Rock Concerts and Sporting Events; Power Tools

120 dB – Jet Planes at Take Off

130 dB – Sirens; Race Cars; Jackhammers

140 dB – Gun Shots; Fireworks

As a general rule, for every 3 dB above the 85 dB threshold, the intensity of a noise rises exponentially. For example, a 100 dB noise or sound has 32 times the destructive power of an 85dB sound or noise.

"Safe" exposure time is reduced by ½ for every 3 dB increase, a time/intensity relationship often referred to as the "exchange rate." The 3 dB exchange rate is widely accepted as a means for developing scientific, evidence-based assessment of the potential for hearing impairment as a function of noise level and duration. The NIOSH chart in the next section shows the 3 dB exchange rate progression clearly.

Exposure Times and Risk

Two U.S. federal agencies that institute policies and enforce regulations related to on-the-job hearing health are the Occupational Safety and Health Administration (OSHA) and the National Institute for Occupational Safety and Health (NIOSH), a branch of the Centers for Disease Control and Prevention (CDC). By and large, the NIOSH standards are stricter, and they recommend shorter exposure times to sound environments with elevated decibel levels.

Recommended Maximum Daily Exposure Times to Instances of Continuous Noise at Various Decibel Levels*

Decibel Level	NIOSH	OSHA
85 dB	**8 hours**	**16 hours**
88 dB	**4 hours**	**10.6 hours**
91 dB	**2 hours**	**7 hours**
94 dB	**1 hour**	**4.6 hours**
97 dB	**30 minutes**	**3 hours**
100 dB	**15 minutes**	**2 hours**
110 dB	**2 minutes**	**30 minutes**
120 dB (close-range)	**almost immediate**	**almost immediate**

***NIOSH and OSHA maintain that the risk for hearing loss is increased when continuous exposure time exceeds these recommended maximums.**

While both OSHA and NIOSH standards are normally applied to industrial facilities where workers face constant and continuous exposure to high sound levels, these recommendations may be applied more broadly to settings beyond the industrial workplace, such as the rehearsal room or the concert hall.

Note 1: OSHA regulations apply to many, many aspects of health and safety at work places of all kinds, including academic institutions.

Note 2: For an application of the above chart to MP3 players, see **Basic Protection for Musicians**.

Note 3: For more detail regarding the time/intensity relationship or the 3 dB exchange rate, see http://www.cdc.gov/niosh/docs/98-126/chap3.html.

Musicians and Risk of Noise-Induced Hearing Loss

Two facts are clear:

- Acute hearing and aural perception are essential for musicians.
- Noise-induced hearing loss is preventable.

Two conclusions are obvious:

- Musicians have basic hearing health responsibilities.
- Sound-level management is a critically important addition to the musician's portfolio of essential disciplines.

Constant attention is necessary because in most instances hearing loss is a gradual process that initially affects a person's ability to hear very high pitched sounds.

Problems with pitch perception and tinnitus may accompany such initial-stage hearing loss, and these may be career-ending for a musician.

Even if debilitating problems do not occur initially, career activity becomes increasingly difficult, and finally impossible as hearing loss proceeds to more advanced stages.

What do these facts and conclusions mean for musicians and for schools and departments of music?

In many cases, musicians are exposed to elevated levels of sound when they rehearse and perform. But such exposure alone does not equal automatic risk of hearing loss. There are many factors involved in benchmarking and determining the risk of exposure.

For musicians, managing hearing health starts with understanding basic facts and avoiding the most obvious problematic situations.

An environment is risky when it is so loud that one must shout to be heard, especially if such loudness is sustained. A list of basics is provided on **Noise Levels and Risk**.

There is more, however. Like most other decisions in advanced music making, thoughtful judgments about what to do and what not to do for yourself and for others involve gaining in-depth knowledge and applying it with sophisticated understanding.

Research-derived metrics are a good example. Metrics are valuable. The NIOSH and OSHA standards provide an authoritative basis for comparisons and further calculations. Analytical studies and lists of findings about decibel levels by noise source, instrument, ensemble, or genre are important and useful. But such data deserves interpretation and contextualization as it is factored into specific decision-making. Remember that NIOSH and OSHA level and duration calculations refer to non-stop exposure to a constant intensity of sound, not to varying intensities over the same period.

Any metric needs to be used with the understanding that in any rehearsal or performance, a number of variables are interacting at the same time and that these interactions are unique to specific settings and situations.

Four major variables are:

Sound-level variation. In some musical situations, decibel levels are essentially constant. However, in most, decibel levels rise and fall. A rock concert may constantly expose performers and audiences to dangerously high noise levels. A classical string quartet performance is usually characterized by fluctuations between soft and loud, with relatively few moments at peak volume.

Settings. Rehearsals and performances may take place in spaces that are right-sized and shaped for the size and volume levels of the individual performer or ensemble. Such spaces have adequate cubic volume. Other spaces may be too small, thus concentrating noise levels. Such spaces do not have adequate cubic volume. Some have proper acoustical treatment for their musical purposes. Others may not. Some settings feature electronic amplification; others do not. Placement of individual musicians in ensembles is also a factor in sound-level exposure. Settings have a significant effect on sound levels.

Distance. The distances between individual musicians and between performers and audience members influence a person's sound-level exposure. Generally, the closer a person is to the source of music or source of amplification, the greater the sound level. This obvious point has applications in many decisions about hearing health.

Length of Exposure. The amount of loud sound varies by type of music, by composition, style, and setting, and by artistic and personal choice. Length of exposure is critical in calculating whether over exposure is occurring and hearing loss is a consideration.

Measurements can be regarding each of these variables, and calculations can determine the composite effect in any specific setting.

Issues associated with the four variables above are active in terms of sound exposure in **Solo and Ensemble** experiences.

Solo and Ensemble

Both single instruments and ensembles can produce a range of sound levels. However, unless there are high levels of amplification, ensembles normally produce more sound than single instruments.

For example, a typical piano practice session may average between 60 and 70 decibels, similar to the intensity of average conversation. At these levels there is no danger no matter how long the practice session lasts.

In ensembles, sound levels for musicians involved can easily go beyond the 85 decibel level where risk begins to grow exponentially. For these musicians, danger increases if high volume levels are prolonged, or the space is too small or acoustically inappropriate for the size of the ensemble, or if electronic amplification is involved.

Sound-level meter readings confirm the obvious. In an overall sense, groups of strings produce less sound than groups of woodwinds, brass, or percussion. Normal or average sound levels from various ensemble configurations vary according to their distribution of instruments and the length of time various instrumental combinations normally play.

In both solo and ensemble settings, choices associated with sound levels clearly matter. A one-hour ensemble experience with several minutes of high volume may carry less risk than continuous high volume exposure in hours of solo practice or listening to an MP3 player for extended periods. Days spent with continuous exposure to high levels of sound are risk-filled days indeed.

In music schools, music students normally participate several times each week in conducted or coached ensembles. This fact places an important item into ensemble rehearsal and performance planning: the cumulative effect of sound exposure when it reaches higher than safe dB levels. Planning choices include but are not limited to repertory, rehearsal sequences, repetition frequencies, durations of loudness, use of sound-level meters, dosimeters, or other scientific instruments for monitoring cumulative exposure.

Measuring Sound Levels Scientifically

Sound-level meters take authoritative scientific measurements. Known more formally as "exponentially integrating sound-level meters," these devices convert sound waves into decibel readings. If properly calibrated, they can accurately measure sound levels between 30 to 130 decibels.

Attached to the shaft of the sound-level meter is a condenser microphone. Using a series of filters, amplifiers, and integrators, the meter converts the microphone's output into a single sound-pressure measurement, which is displayed on the meter's screen.

Because sound-level meters utilize directional microphones, they are most accurate when pointed in the direction of the noise source. For the measurement of ambient noise sources, the placement of the microphone is less important, and the user may wish to place the device in a central location.

An alternative to the standard sound-level meter is the noise dosimeter, or personal sound exposure meter, a device used regularly in many settings to measure exposure/risk relationships. Worn on a person's body, its accuracy is somewhat compromised by the acoustical presence of the individual wearing it.

Sound-level meters and dosimeters range in price from $20 to $2000 dollars. Most acousticians recommend using devices that meet American National Standards Institute (ANSI) specifications.

Measuring devices continue to improve along with the general scientific and technological advance, and purchasing programs are advised to factor this evolution into their plans.

Basic Protection for Musicians

On stage and in life, it is important for musicians to take steps to protect their hearing. Sometimes, however, it is not possible or preferable to completely avoid a loud sound or noisy environment. At these times, musicians and music faculty may wish to explore the following methods of hearing protection:

- Earplugs – often made of foam or silicone; designed to be inserted into the wearer's ear canal to protect against loud noise; some designed specifically for music applications.

- Earmuffs – often consist of two protective foam pads connected by a headband or strap; designed to cover the wearer's ears and protect against loud noise

- Acoustical sound shields – generally made of clear plexi-glass or similar material; used to isolate and redirect the noise from a particular instrument or section of a band, orchestra, or ensemble; protects the hearing of musicians directly in front of the shielded instrument or section

Musicians often find that hearing protectors are not comfortable or that they create perceptual changes, even causing users to increase sound-intensity levels to compensate. One solution is to reduce the "average" sound-level exposure in rehearsals by making balanced repertory choices and giving greater attention to dynamic levels, especially in large or amplified ensembles. See **Musicians and Risk of Noise-Induced Hearing Loss** and **Solo and Ensemble.**

Protection also comes from regular behaviors such as:

- Avoiding situations likely to pose a danger to hearing health.

- Refraining from certain activities that can endanger hearing mechanisms.

- Maintaining a safe distance from sources of loud noise.

- At loud concerts, sitting or standing a "safe" distance from the stage and from speakers or other amplification devices.

- Keeping MP3 players and other listening devices at "safe" volume levels. MP3 players need special attention. Normally, MP3 players generate about 85 dB at one-third of their maximum volume, 94 dB at half volume, and 100 dB or more at full volume. Translated into daily exposure time, according to NIOSH standards, 85 dB equals 8 hours; 94 dB, 1 hour; and 100 dB, 15 minutes. These numbers assume that an individual is not exposed to any other noise beyond 85 dB during the day.

- Taking care with in-ear monitors, a device that has grown in popularity among musicians, especially in certain types of professional ensembles. These monitors can produce dangerously high sound levels. Musicians should see an audiologist or other qualified professional for a demonstration of safe practices before using an in-ear monitor for the first time and use the device in a manner that protects their hearing health.

- Developing a sense of the extent to which daily exposure has exceeded safe volume levels and durations (See **Noise Levels and Risk** and **Exposure Times and Risk.)**

- Taking breaks from exposure to elevated noise levels. (Enjoying quiet time.) See also Note 1 in the section *Exposure Times and Risk*.

Basics Music Professionals Need to Know and Be Able to Do

- Understand and share with others the risks inherent in excessive high-decibel sound exposure, including the risk of permanent hearing damage.

- Recognize that music can be a sound source capable of causing noise-induced hearing loss.

- Maintain familiarity and currency with health and safety codes and with standards and procedures related to noise exposure.

- Make practical assessments of sound levels.

- Apply hearing health knowledge in specific musical contexts, such as performance, production, education, competition, and listening.

Students need to gain these knowledge and skills during the course of their studies and preferably as soon as possible.

Part II. Considerations for Faculty and Staff

Please find below a number of ways you can promote hearing health in your faculty or staff role.

Hearing Health in Music Classrooms, Studios, Rehearsals, and Other Spaces

- Help students understand the importance of hearing health and their responsibility for acting responsibly.

- As a teacher or conductor, you have a significant role in maintaining volume levels in the classroom that do not exceed reasonable levels, especially for long periods. If you are concerned about volume levels in your classroom or rehearsal space related to either room size or construction or to class enrollment, notify an administrator. Large ensembles may not always need to rehearse at full volume.

- Monitor sound levels in your classroom and rehearsal and performance spaces by utilizing available tools, such as a sound-level meter, especially if there is a reasonable chance that sound levels are high for long periods.

- Provide breaks for your students during rehearsal. This “quiet time” is beneficial to both their ability to concentrate and to their hearing health.

- If appropriate, speak with students and administrators about protective devices such as earplugs and sound shields.

- If you suspect that a student is having difficulty hearing (or if he or she reports such a difficulty), refer the student to the appropriate student health personnel at the institution. Your advice *must not* take the place of that of a licensed medical professional. Acting in this capacity exposes you to potential liability.

Ideas and Recommendations for Music Schools and Departments

Here are some ideas, courtesy of other institutions, schools of music, and departments:

- Institute a hearing health awareness policy within the music school or department.

- Establish a mechanism for addressing concerns related to issues of hearing health for faculty, staff, and students.

- Invest in a sound-level dosimeter or other sound-level meter or appropriate sound measuring tool. From time to time, measure sound levels in instructional and performance spaces to ensure that they remain within acceptable levels.

- Consider limiting the size of rehearsal groups, or utilizing a larger space when conducting rehearsals. When appropriate, move marching band or pep band rehearsals outside to a sports field or other open space. Remember: the smaller the rehearsal or performance space, the more concentrated the sound.

- Line problematic rehearsal spaces with heavy drapes to help absorb sound.

- Apply carpet to the floors of problematic rehearsal rooms to help absorb sound.

- Place acoustical shields in front of the brass and percussion sections to protect the hearing of the musicians directly in front of these sections.

- Consider making performance-grade earplugs available to students, either on a complimentary basis or for purchase.

- Place treble brass musicians on risers. This way, higher frequency sound waves, such as those played by a trumpet player, will go over the heads of the musicians in the sections in front of them.

- Elevate loudspeakers to near ear level so that they provide musicians with better sound quality at lower levels of intensity.

- Place instrumental groups back from the lip or edge of the stage to achieve optimal acoustics in the audience.

Conclusion

As educators, you and your colleagues are tasked with preparing the next generation of musicians. Some may go on to play professionally, others may decide to teach, and still others will embrace music as a life-long hobby. Whatever their future aspirations, students' hearing health is vital to their success as musicians and to their overall happiness.

Hearing health is essential, too, for faculty and staff engaged in playing and teaching music.

Certain behaviors and exposure to certain sounds can, over time, damage hearing. It is important to understand and avoid those risk factors that can compromise hearing ability.

With this document, we hope we have been able to shed some light on a very important issue and perhaps inspired you to take steps in various aspects of your own work.

Resources – Information and Research

NASM-PAMA Resource Documents and Orientation Materials

Information and Recommendations for Administrators and Faculty in Schools of Music

Protect Your Hearing Everyday: Information and Recommendations for Student Musicians
- *A Sample Order and Script for Music Student Orientation*
  - Standard Version
  - Version for Customization
- *Student Text Version of the Orientation Script*
  - Standard Version
  - Version for Customization

Protecting Your Hearing Health: Student Information Sheet on Noise-Induced Hearing Loss
- Standard Version
- Version for Customization

Hearing Health Project Partners

National Association of School of Music (NASM)
http://nasm.arts-accredit.org/

Performing Arts Medicine Association (PAMA)
http://www.artsmed.org/index.html

PAMA Bibliography (search tool)
http://www.artsmed.org/bibliography.html

General Information on Acoustics

Acoustical Society of America (http://acousticalsociety.org/)

Acoustics.com (http://www.acoustics.com)

Acoustics for Performance, Rehearsal, and Practice Facilities
Available for purchase through the NASM Web site (http://nasm.arts-accredit.org/)

An Acoustics Primer for Music Spaces (Wenger Corporation)
http://www.wengercorp.com/Lit/Wenger%20Acoustics%20Primer.pdf

Health and Safety Standards Organizations

American National Standards Institute (ANSI) (http://www.ansi.org/)

The National Institute for Occupational Safety and Health (NIOSH) (http://www.cdc.gov/niosh/)

Occupational Safety and Health Administration (OSHA) (http://www.osha.gov/)

Medical Organizations Focused on Hearing Health

American Academy of Audiology (http://www.audiology.org/Pages/default.aspx)

American Academy of Otolaryngology – Head and Neck Surgery (http://www.entnet.org/index.cfm)

American Speech-Language-Hearing Association (ASHA) (http://www.asha.org/)

Athletes and the Arts (http://athletesandthearts.com/)

House Research Institute – Hearing Health (http://www.hei.org/education/health/health.htm)

National Institute on Deafness and Other Communication Disorders – Noise-Induced Hearing Loss (http://www.nidcd.nih.gov/health/hearing/noise.html)

Other Organizations Focused on Hearing Health

Dangerous Decibels (http://www.dangerousdecibels.org)

Musicians' Clinics of Canada (http://www.musiciansclinics.com/home.asp)

National Hearing Conservation Association (http://www.hearingconservation.org/)