

## Protecting the Hearing of Performing Artists

For most people, optimal performance and enjoyment of the performing arts require the use of sight, hearing, and, for performers, touch. In general, the use of the eyes to see what is happening during a performance or on a score does not cause degradation of the ability to visualize the world around us, even if the ambient light is bright. Likewise, using one's sense of touch does not cause it to deteriorate, even if we touch hard surfaces with some force. However, both performers and audiences are at significant risk of hearing loss if the sounds around them are too loud.

While there are many causes of hearing loss, many of which have nothing to do with exposure to loud noises, noise (or music)-induced hearing loss is theoretically preventable 100% of the time. Loss of hearing is typically a major problem if it happens to dancers and actors, but it is catastrophic for musicians. Thus, it is not surprising that this topic has been covered extensively in *Medical Problems of Performing Artists*, starting with "The Musician and Occupational Sound Hazards" by Hart et al.<sup>1</sup> in volume 2, over 20 years ago. Since then articles in *MPPA* and other journals have gradually added to our understanding of the risk factors and potential preventive strategies. I would remind readers of the two excellent review articles that appeared in this journal recently: "Hearing Loss: A Primer for the Performing Arts" by Douglas Owens in the December 2008 issue<sup>2</sup> and "Protecting Musicians from Hearing Loss: A Review of Evidence-based Research" by Michael Santucci in the September 2009 issue.<sup>3</sup> Without duplicating the content of those articles, this editorial will try to determine why this remains a somewhat controversial topic in the performing arts and

what can be done to move us forward.

While everyone agrees that having as close to perfect hearing as possible is important for musicians, no one has defined exactly what the critical level of hearing acuity is for musicians and how much hearing one can lose and still perform at the highest levels. Of course, musical performance is a multicomponent set of skills, and it is possible that a deficit in hearing can be compensated for with other skills. Nonetheless, it would be helpful to know more about the interaction between noise/music-induced hearing loss, age-related hearing loss, other types of hearing loss and the ability to perform. By the way, there's a test of high-pitch hearing acuity available on the web.<sup>4</sup> At age 56, I'm done at about 12,000 Hz.

Equally uncertain is the prevalence of hearing loss in various musician populations, especially classical/orchestral musicians. In order to put the numbers into perspective, it is important to recall the likelihood of having hearing loss in the general population at various ages. Overall, about 16% of the non-elderly (20- to 69-yr-old) adult population has some degree of measurable hearing loss in the frequencies that are used for speech (and music).<sup>5</sup> The number increases with age from only a few percent of young adults to a large majority of octogenarians. Jazz and rock musicians have a high prevalence of hearing loss, but different studies have disagreed on the specific percentage, ranging from less than 10% to nearly 60%.<sup>6</sup> It's even harder to determine what the true frequency of hearing loss is for classical musicians. Some studies have shown virtually no increase over the rate expected for persons of the same age,<sup>7</sup> whereas others have suggested that

about one in three have some hearing impairment.<sup>8</sup> These discrepancies in the data may be one of the reasons why not much has been done so far to address this issue systematically.

Another reason for the lack of agreement on how urgent a problem this is may relate to the paucity of "poster children" for hearing loss among musicians. Even though it undoubtedly occurs, I'm not aware of any well-known musicians who have publicly declared that he or she has hearing loss as a result of exposure to loud music. It is a largely invisible problem. We can present all the data in the world, but putting a face on the problem will probably be a more potent weapon in the effort to preserve musicians' hearing. Likewise, the absence of high-profile "celebrity" endorsements of hearing protection may send a message that you can become really good even if you don't bother with protecting your organ of Corti.

One of the most researched topics relating to hearing loss in musicians is the extent to which high sound pressure levels occur during musical performances. Two recent articles in *MPPA* have added to our understanding of the spatial and temporal distribution of sound exposure in university-level ensembles. Jennifer Stewart Walter's article in the June 2009 issue, "Sound Exposure Levels Experienced by University Wind Band Members,"<sup>9</sup> presented data on exposure to high sound pressure levels according to where musicians sit in the orchestra. About half of the musicians experienced at least one rehearsal during the 1-week study period that exceeded the allowable exposure, and over one third of musicians averaged more than 100% of the allowable exposure during the

week. The sample studied by Walter did not show a clear relationship to position on the stage, but some instruments (mostly brass) were clearly associated with higher exposure levels.

The article by Kris Chesky in this issue of the journal, "Measurement and Prediction of Sound Exposure Levels by University Wind Bands,"<sup>10</sup> examines the exposure to sound over time in two ensembles at a single institution. By using a single dosimeter positioned over the conductor, measurements of sound exposure could be made every second during rehearsals over the course of a semester. While sound exposure varied considerably from day to day for both groups, one ensemble had significantly higher sound exposure than the other. This appears to be related to factors under the control of the conductor, such as how much time the ensemble spends creating various sound pressure levels. Figure 3 in Chesky's paper shows that the ensemble with the lower (safer) sound exposure level did not simply cap their playing at mezzoforte; they covered the entire dynamic spectrum, but they spent less time making the loudest sounds and more time making softer sounds.

The five components of a hearing conservation program are:

1. measuring sound pressure levels
2. monitoring the hearing of those who spend time in noisy environments
3. education
4. reducing exposures through environmental modifications, and
5. using hearing protection devices during exposure to loud sounds.<sup>3</sup>

Five years have passed since the Health Promotion in Schools of Music

Project called for educating college-level music students about hearing loss as part of ensemble-based instruction.<sup>11</sup> The recent addition of information on noise-induced hearing loss to the CDC's Healthy Youth! website<sup>12</sup> indicates that federal health policy experts recognize this as an important problem, and discussions are continuing among the various stakeholders in the performing arts and hearing health. However, no formal survey of university music programs has been done, and I have not heard of any widespread adoption of hearing loss prevention programs in the postsecondary setting. Nor do we have a description of even one model hearing protection program that has been implemented at a university-level music program.

What are the barriers? As usual, we can say that hearing conservation programs will cost money and the resources simply are not available. But that is not a valid reason to delay adding information on hearing protection to existing occupational health programs or to work with ensemble directors to achieve reasonable sound pressure levels. Doing audiograms on music students and purchasing hearing protectors for those who are exposed to loud music will cost some money, but the cost is small when compared to tuition.

The bigger barrier is probably attitudinal. Attitudes can be changed with education and with interactions with peers and experts. This will require leadership at each music school. MPPA is eager to help move this process along. Manuscripts presenting data on the current state of hearing protection at music schools around the world are invited—we can probably learn from our colleagues in countries that have taken a more progressive approach to this prob-

lem. Likewise, a description of a model hearing protection program would be welcomed as well. We should be able to make significant progress by 2014, the 10th anniversary of the Health Promotion in Schools of Music Project.

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### CALL FOR PAPERS: Hearing Protection at Schools of Music

Papers presenting data on the state of hearing protection at music schools, as well as descriptions of hearing protection programs that have been implemented, are invited for consideration in MPPA. For information or to submit papers, please email the Editor at [mppa@sciandmed.com](mailto:mppa@sciandmed.com).