Now Hear This . . .

Volume 11, No. 4 Winter 2008-2009

Hearing Loss in the Orchestra

We recently were contacted by an audiologist who was concerned about noise levels to musicians in a high school orchestra. This is definitely an area of concern, considering the noise levels of various instruments both alone and in combination as well the recurrent nature of the exposure. Table I shows noise levels of various instruments. Risk of high noise exposure is clearly not limited to being around amplified rock guitars. Considering the regular practice of dedicated musicians, the risk of adverse noise exposure is a daily occurrence and is not limited to the intermittent exposure that occurs with public performances. During performances not only will the instrument an individual plays generate noise, but also the multiple instruments around the individual will generate even more noise, particularly if someone is near the brass or percussion sections.

Table I. Decibel Readings of Musical Instruments

Musical Noise	Noise Level (dB)
Normal piano practice	60-70
Fortissimo singer 3 feet away	70
Chamber music in small auditorium	75-85
Piano fortissimo	92-95
Violin	84-103
Cello	82-92
Oboe	90-94
Flute	85-111
Piccolo	95-112
Clarinet	92-103
French horn	90-106
Trombone	85-114
Timpani & bass drum rolls	106
Symphonic music peak	120-137
Amplified rock music at 4-6 feet away	120
Rock music peak	150

Notes:

- The brass section playing fortissimo can drown out practically the whole orchestra.
- One-third of the total power of a 75-piece orchestra comes from the bass drum.

(Adapted from HEAR Web site www.hearNet.com)

Table II shows the results of audiometric testing from three published studies on classical musicians and results from 2008 among the faculty and graduate students from a local college of music. As noted in a review article of these previous studies there is an absence of a consistent definition for hearing loss and lack of attention to the time of testing to exclude a temporary threshold shift (Palin, 1994).

Among the 18 individuals tested in 2008 from a music college in Michigan, seven (39%) had at least an average 25 decibel loss at 3000, 4000 and 6000 hertz. This included three of four individuals in their 30's, two of five in their 40's, one of three in their 50's and one of two in their 60's.

Some consistent findings of audiometric studies in classical musicians include: violinists have worse hearing in their left ear, presumed to be secondary to the usual location of the violin when it is being played; and the highest risk of hearing loss was among brass players.

Musicians have been resistant to use hearing protection because normal hearing protection provides extra attenuation at the higher frequencies and affects the quality of music heard.

Hearing protective devices that attenuate sound equally across all frequencies are marketed as appropriate for musicians. Both ready-fit and custom fit devices are available. Both types are more expensive than traditional hearing protection ($12 range for ready fit and $175-$200 for custom fit). Ear phone systems that both protect hearing and provide feedback to the musician instead of stage monitors are also available in the $200 range.

Given the hearing loss that has already occurred among musicians, researchers have also been addressing the needs of musicians by providing hearing aids that are optimally set for music. An article that comprehensively addresses this issue is:

Chasin M, Russo FA. Hearing aids and music. Trends in Amplification 2004; 8:35-47.

Table II. Hearing Test Results in Classical Musicians

Study Locations	Year Tested	Number Tested	Percent with Hearing Loss
Swedish Classical Musicians (Axelsson, 1981)	1981	139	37%
Danish Orchestral Musicians (Ostri, 1989)	1989	96	58%
Chicago Symphony Orchestra (Royster, 1991)	1991	59	71%
Music College in Michigan	2008	18	39%

As always we remain interested in receiving your reports of work-related hearing loss, whether among musicians or other professions. Dr. Kenneth Rosenman can be reached at our toll-free number: 1-800-446-7805, to discuss diagnostic issues and/or management of individual patients.

Michigan Law Requires the Reporting of Known or Suspected Occupational NIHL
Reporting can be done by:
FAX: (517) 432-3606
Telephone 1-800-446-7805
E-Mail ODREPORT@ht.msu.edu
Web site: www.oem.msu.edu
Mail: Michigan Occupational Safety & Health Administration
Management and Technical Services Division
PO Box 30649 Lansing, MI 48909-8149

References

Axelsson A, Lindgren F. Hearing in classical musicians. Acta Otolaryngol 1981; 377 (Suppl.):3-74.

Ostri B, Eller N, Dahlin E, Skylv G. Hearing impairment in orchestral musicians. Scand Audiol 1989; 18:243-249.

Palin SL. Does classical music damage the hearing of musicians? A review of the literature. Occupational Medicine 1994; 44:130-136.

Royster JD, Royster LH, Killion MC. Sound exposures and hearing thresholds of symphony orchestra musicians. J Accoust Soc Am 1991; 89:2793-2803.

Association of Adult Musicians with Hearing Loss
Offers links to support groups for musicians with hearing loss. www.aamhl.org

HEAR
A non profit hearing information source for musicians and music lovers. Links to many resources, including brochures and information for audiences of all ages.
www.hearnet.com

Musician's Clinics of Canada
Clinic devoted to the occupational health problems of musicians including hearing loss. Resource for many questions-and-answers about hearing loss.
www.musiciansclinics.com

Now Hear This is published quarterly by Michigan State University-College of Human Medicine with funding from the Michigan Occupational Safety & Health Administration (MIOSHA) and is available at no cost. Suggestions and comments are welcome.

(517) 353-1846
MSU-CHM
117 West Fee Hall
East Lansing, MI 48824-1316

Michigan Law Requires the Reporting of Known or Suspected Occupational NIHL

Reporting can be done by:

Internet
www.oem.msu.edu
E-Mail
ODREPORT@ht.msu.edu
FAX
517-432-3606
Telephone
1-800-446-7805
Mail
MIOSHA-MTS Division
P.O. Box 30649
Lansing, MI 48909-8149

Suggested Criteria for Reporting Occupational NIHL

1. A history of significant exposure to noise at work; AND
2. A STS of 10 dB or more in either ear at an average of 2000, 3000 & 4000 Hz. And the employee's total hearing level is 25 dB or more at the same three frequencies. OR
3. A fixed loss.*

*Suggested definitions: a 25 dB or greater loss in either ear at an average of: 500, 1000 & 2000 Hz; or 1000, 2000 & 3000 Hz; or 3000, 4000 & 6000 Hz; or a 15 dB or greater loss in either ear at an average of 3000 & 4000 Hz.

Printed on recycled paper.

Address service requested.

Michigan State University
College of Human Medicine
117 West Fee Hall
East Lansing, MI 48824-1316
Phone (517) 353-1846

Now Hear This...

In this issue:
v11n4: Hearing Loss in the Orchestra