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## PREVENTING NOISE-INDUCED HEARING LOSS AMONG YOUNG PEOPLE

- Ask about occupational and recreational exposure to loud sounds.
- Advise patients to
  - reduce the volume, limit listening time, and take regular breaks when using headphones,
  - use earplugs or earmuffs in environments where loud sounds cannot be avoided.
- Screen young people and others exposed to loud sounds for possible hearing loss.

In the United States (US), an estimated 5 million children and adolescents aged 6 to 19 years<sup>1</sup> and 26 million adults aged 20 to 69 years<sup>2</sup> have hearing loss associated with exposure to loud noise. Hearing loss is becoming more prevalent, particularly among young people up to 29 years of age.<sup>3</sup> In 2005-2006, approximately 20% of people aged 12 to 19 years were affected by hearing loss, compared with 15% in 1988-1994, and adolescent males were significantly more likely to be affected than adolescent females.<sup>4</sup> In 2011, 10% of New Yorkers aged 18 to 24 reported ringing in the ears or hearing loss.<sup>5</sup>

Exposure to loud sounds even for short durations can result in temporary hearing loss, which may become permanent with repeated exposure.<sup>6</sup> Chronic exposure to loud sound can damage the inner ear, resulting in noise-induced hearing loss (NIHL) and tinnitus. Chronic exposure to loud sound is also associated with cardiovascular disease and stress,<sup>7</sup> and, in children, language and learning problems. Among children and adolescents, hearing loss has been associated with lower test scores and self-esteem, and increased stress and risk of injury.<sup>8-13</sup>

Although NIHL is permanent, it can be prevented by limiting exposure to loud sound.<sup>14</sup>

### EXPOSURE TO HAZARDOUS SOUND AMONG YOUNG PEOPLE

Permanent hearing loss can occur from routine exposure to sounds at 85 decibels (dB) for more than 8 hours a day.<sup>14</sup> For sounds at higher dB, even shorter durations of exposure can cause hearing loss. For example, regular exposures of more than 15 minutes to sounds louder than 100 dB can cause hearing loss over time, and a

one-time exposure to an extremely loud sound such as an explosion can cause immediate hearing loss.<sup>6,15</sup>

A common exposure to loud sounds is through headphones. Almost 2 million (61%) New Yorkers aged 18 through 44 report listening to music with headphones, and 150,000 (5% of this age group) report heavy headphone use, that is, listening at high volume 5 to 7 days per week for 4 or more hours per day on average.<sup>5</sup> Almost one-quarter of these heavy users report hearing problems.<sup>5</sup> Young people are also exposed to loud sounds during recreational activities (eg, attending concerts), at home (eg, using a hair dryer), at school (eg, noisy cafeteria), in the environment (eg, traffic and subway noise), and at work<sup>15-18</sup> (**Table 1**). Manufacturing, construction, transportation, and music and entertainment are examples of noisy industries where young people may be exposed to harmful sounds.<sup>19</sup> Listening to music with headphones in a noisy environment can be even more hazardous because listeners are likely to turn up the volume on their headphones in the presence of background noise.<sup>20</sup>



**TABLE 1. APPROXIMATE DECIBEL LEVELS OF COMMON SOUNDS<sup>6,15-18,21</sup>**

Sound Source	Approximate Noise Level (dB)	Recommended Time Limit for Repeated Exposure	
Firecracker	150	Immediate hearing damage possible	Prolonged exposure at close proximity may cause hearing loss. Hearing protection should be used if there is regular exposure to sound at this level beyond the exposure time limit.
Ambulance siren	120	7 seconds	
Chainsaw, rock concert	110	< 2 minutes	
Personal music player at maximum level	105	< 5 minutes	
Wood shop	100	15 minutes	
Motorcycle	95	< 1 hour	
Lawnmower, subway (max)	90	< 2 hours	
Heavy city traffic, hair dryer, school cafeteria	85*	8 hours	
Normal conversation	60	No limit	
Quiet office	50-60		
Refrigerator humming	40		
Whispered voice	30		

\*Permanent hearing damage can occur from routine exposure to sound at 85 dB for more than 8 hours a day. Reduce exposure time in half with each additional 3 dB. Recommended exposure limits (RELs) are based on repeated exposures occurring in an occupational setting over a period of years. Hearing damage from noise adds up over time. Single exposures do not pose an immediate risk of hearing loss unless sound levels equal or exceed 140 dB.<sup>21</sup>

Please note: exposure levels are not exact and vary by distance from the source. It is important to limit exposure to any sound that is 85 dB or greater.

People already suffering from some degree of hearing loss should reduce exposure to loud sounds to protect their remaining hearing. Diabetes, smoking, and exposure to certain chemicals may also increase susceptibility to NIHL.<sup>22</sup>

## PREVENTION

Ask patients about their exposure to loud sounds and encourage them to take measures to protect their hearing (**Box 1**), even if they report only occasional exposure. Educate patients about the risks of exposure to loud sounds and on how they can recognize when a sound is too loud (**Box 2**). It is especially important to educate young people about the hazards of noise exposure, as they may be persuaded to modify behavior if given proper counseling by a health care provider.<sup>23,24</sup> Advise children, adolescents, and young adults who use headphones to reduce the volume, limit listening time, take regular breaks, and never listen at maximum volume.

Also advise these groups to use earplugs or earmuffs in environments where the volume is not in their control, including the workplace.<sup>6</sup> Earplugs are placed in the ear canal so that they totally block the canal, reducing the volume of sound. Earmuffs fit completely over both ears, fitting tightly to reduce the volume.<sup>6</sup> Cotton in the ears, winter ear warmers, and audio headphones are not

appropriate hearing protection devices.<sup>17</sup> Encourage patients to speak with employers about workplace noise. Most employers are required to administer a hearing conservation program and provide hearing tests if the noise level exceeds certain limits.<sup>25</sup>

## SCREENING AND REFERRAL

Periodically ask adolescents,<sup>26</sup> young adults, and people with occupational or recreational exposure to loud sound<sup>27</sup> about their hearing:

- Do you experience ringing or a hissing sound in your ears?
- Do you have trouble hearing over the telephone?
- Do you have trouble following the conversation when 2 or more people are talking at the same time?
- Do you have trouble hearing with a noisy background?
- Do you find yourself asking people to repeat themselves?
- Do you often misunderstand what others are saying?
- Do you have trouble hearing for a while after you've listened to loud music or attended an event in a noisy arena?

Answering "yes" to 3 or more of these questions could indicate a hearing problem. Following a physical exam that includes otoscopic evaluation, refer those who report

hearing problems to an audiologist. Consider additional etiologies—the differential diagnosis of hearing loss is broad and the audiologist can help determine if NIHL is the correct diagnosis.

## SUMMARY

Noise-induced hearing loss is irreversible but preventable. Screen young people for exposure to loud sounds. Educate patients about protecting themselves from the health risks of excessive exposure to loud sounds. Refer patients with potential hearing loss for a full audiometric evaluation. ♦

### BOX 1. WHAT TO TELL PATIENTS ABOUT PROTECTING THEIR HEARING<sup>6</sup>

- When listening to music with headphones
  - reduce the volume,
  - limit listening time,
  - take regular breaks,
  - never listen at maximum volume.
- If you can't avoid noisy environments
  - limit time spent exposed to loud sound,
  - move away from sources of loud sound,
  - use appropriate hearing protection (**Resources**).
- Participate in workplace hearing conservation programs and comply with all noise reduction measures.

### BOX 2. WHEN IS SOUND TOO LOUD?<sup>28</sup>

Sound is too loud when

- you have to raise your voice to be heard by someone standing nearby,
- you get a buzzing or ringing sound in your ears, even temporarily,
- you experience sounds that are muffled after the exposure to the sound stops,
- the sound hurts your ears.

## RESOURCES

### For Providers

- American Academy of Pediatrics. Bright Futures Medical Screening Reference Table—Adolescent Visits: [http://brightfutures.aap.org/pdfs/Guidelines\\_PDF/18-Adolescence.pdf](http://brightfutures.aap.org/pdfs/Guidelines_PDF/18-Adolescence.pdf)
- American Academy of Family Physicians. Differential Diagnosis and Treatment of Hearing Loss: [www.aafp.org/afp/2003/0915/p1125.html](http://www.aafp.org/afp/2003/0915/p1125.html)
- NYC Vital Signs. Hearing problems and headphone use in New York City: [www.nyc.gov/html/doh/downloads/pdf/survey/survey-2013noise.pdf](http://www.nyc.gov/html/doh/downloads/pdf/survey/survey-2013noise.pdf)

### For Patients

- American Academy of Otolaryngology—Head and Neck Surgery: <http://entnet.org> (find a provider)
- American Speech-Language-Hearing Association
  - Listen to Your Buds: [www.listentoyourbuds.org](http://www.listentoyourbuds.org) (information for parents)
  - Find a Professional: [www.asha.org/findpro](http://www.asha.org/findpro)
- Centers for Disease Control and Prevention
  - Choosing the hearing protection that's right for you: [www.cdc.gov/niosh/topics/noise/choose.html](http://www.cdc.gov/niosh/topics/noise/choose.html)
  - Hearing protector device compendium: [www.cdc.gov/niosh/topics/noise/hpcomp.html](http://www.cdc.gov/niosh/topics/noise/hpcomp.html)
- New York City Department of Health and Mental Hygiene
  - Headphones and Hearing Health: [www.nyc.gov/html/doh/downloads/pdf/environmental/headphone-faqs.pdf](http://www.nyc.gov/html/doh/downloads/pdf/environmental/headphone-faqs.pdf)
  - Noise in the Workplace: [www.nyc.gov/html/doh/html/environmental/noise-workplace.shtml](http://www.nyc.gov/html/doh/html/environmental/noise-workplace.shtml)
  - Noise in the Community: [www.nyc.gov/html/doh/html/environmental/noise-community.shtml](http://www.nyc.gov/html/doh/html/environmental/noise-community.shtml)
- National Institute for Deafness and Communication Disorders
  - It's a Noisy Planet: [www.noisyplanet.nidcd.nih.gov/parents/Pages/Default.aspx](http://www.noisyplanet.nidcd.nih.gov/parents/Pages/Default.aspx) (information for parents and children to ages 8 to 12)
- United States Department of Labor: Occupational Safety and Health Administration. Occupational Noise Exposure: [www.osha.gov/SLTC/noisehearingconservation/index.html](http://www.osha.gov/SLTC/noisehearingconservation/index.html)

**NOISE COMPLAINTS: Call 311**

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42-09 28th Street, Long Island City, NY 11101 (347) 396-2914

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New York State Department of Health  
Ariel Spira-Cohen, PhD, Environmental Health Scientist

**Consultants**  
Richard Bordowitz, MD, James J. Peters Bronx Veterans Administration  
Medical Center, Bronx, NY  
Sujana Chandrasekhar, MD, Mount Sinai Medical Center, New York, NY  
Ellen Lafargue, AuD, Center for Hearing and Communication, New York, NY  
Nikol Leitner, AuD, Montefiore Medical Center, Bronx, NY

**Division of Epidemiology**  
Carolyn Greene, MD, Deputy Commissioner

**Provider Education Program**  
Ram Koppaka, MD, PhD, Director  
Peggy Millstone, Director, Scientific Communications Unit  
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