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Can you Hear me now?- A Unseen Truth

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Abstract

Dental professionals are at risk for noise- induced hearing loss. Often, individuals are not aware that they have hearing loss their first complaint and the reason they seek a hearing evaluation may in fact be tinnitus. The dental office environment subject's dental professionals to noises associated with hand pieces and ultrasonic's as well as other dental equipment. Hand pieces must be well maintained to reduce the level of noise emanating from them. Hearing protection devices can be used to help prevent hearing loss. Several types are available, and musician's earplugs may be particularly useful as they reduce noise while still enabling the individual to hear and communicate with others.

Keywords: Noise; Hearing damage; Dental practice

Introduction

The National Institute for Occupational Safety and Health (NIOSH) has identified noise as one of the ten leading causes of work related diseases or in¬juries. Noise can cause masking of unwanted sounds, interference with speech and communication, pain and injury, and temporary and permanent hearing loss [1]. Prolonged exposure to noise can lead to noise- induced hearing loss (NIHL) and it may be undetected for years since it is estimated that individuals lose about 28% of hearing before becoming aware of the problem [2]. As dental professionals, we encounter several occupational hazards every day. Hearing loss is definitely one of them and which is ignored by dentist. Our hearing might be at risk due to the various noises encountered in our dental practice that may make us susceptible to the development of permanent hearing loss. Noise is an acoustic phenomenon which mainly arises in a gas, solid or, on occasion, liquid environment. We are all accustomed to everyday "normal noise", which are constantly present all around us. Apart from normal noise we as dental professionals have to encounter noises which are always present in our dental offices. `Noise or sound intensity is measured in decibel (dB) [3].

Production of noise in dental office

Dental setup there is various sources which produce noise such as high speed hand pieces, high velocity suction, ultrasonic scalar and cleaner, mixing devices and model trimmers. Kilpatrick has listed the decibel ratings for various office instruments and equipment, which amount to 70-92dB for high- speed turbine hand pieces, 91dB for ultrasonic cleaners, 86dB for ultrasonic scalers, 84dB for stone mixers and 74dB for low- speed hand pieces [4] Table 1.

Table 1: Production of noise in dental office.

Effects of Noise	
Auditory effects:	Non Auditory Effects:
Auditory Fatigue (90dB or 4000Hz)	Interference with speech
Deafness- Temporary (4000-6000Hz)	Annoyance
Permanent (100dB)	Reduction in efficiency
	Physiologic damage (increased intracranial
	pressure, increased heart rate, headache etc)

Types of Hearing Loss Induced by Noise [5]

Ear can be injured by noise in 2 different ways, depending on the type of exposure. High- level, short duration exposures exceeding 140dB can stretch the delicate inner ear tissues beyond their elastic limits, then rip or tear them apart. This type of damage acoustic trauma occurs rapidly and results in an immediate, permanent hearing loss. The second type of injury is due to exposure to noise between 90 and 140dB damages the cochlea metabolically rather than mechanically and causes damage relative to the level and duration of exposure. Noise-induced hearing loss, in contrast to acoustic trauma, develops slowly over years, is caused by any exposure regularly exceeding a daily average of 90dB, and proceeds in 3 stages.

In the first stage, sensory cells within the cochlea are damaged by excessive exposure. These cells do not regenerate; they are replaced by scar tissue. In the second stage, after weeks to years of excessive exposure, hearing loss can be detected audiometrically. Early loss occurs in the high- frequency range, around the highest C note played on a piano. Speech comprehension is not significantly affected; therefore, this loss is seldom noticed unless hearing is tested for some other reason. With continued exposure, the loss spreads to the lower pitches necessary for understanding speech. At this point, the third stage, the patient usually becomes aware of the problem and may seek medical attention. Unfortunately, much of the damage has already occurred.

Noise control in dental operatory

Noise monitoring should be done with noise dosimeters routinely in the dental operatory Table 2 [6-10] and necessary measures to reduce noise should be taken [11].

Table 2: Noise control in dental operatory.

Author	Review of Literature
Bahannan S [1]	According to a study, the laboratory machines produced more noise (81.42dB) compared to laboratory electromotor (74.95dB), turbine handpiece (72.91dB) and low speed handpiece (69.71dB) creating a greater risk to laboratory technicians working for more than 8 hours
Wilson [6] & Trenter SC [7]	Some authors have proposed that ultrasonic scalers may be a potential hazard to the auditory system of both clinicians and patients
Kadankuppe S [8]	The results of another study found sig¬nificant differences in the noise levels at 6m and 2 inches from the operator ear, the laboratory engines producing the highest noise
Singh et al. [9]	Dental laboratory machine, dental hand-piece, ultrasonic scalers, amalgamators, high speed evacuation, and other items produce noise at different sound levels which is appreciable. The noise levels generated varied between 72.6dB in pre-clinics and 87.2dB in prosthesis laboratory. Although the risk to the dentists is lesser, but damage to the hearing is possible over prolonged periods.
Qsaibati L [10]	In dental clinics, the highest noise was produced by micro motor handpiece while cutting on acrylic (92.2dB) and lowest noise (51.7dB) was created by ultrasonic scaler without suction pump. The highest noise in laboratories was caused by sandblaster (96dB at a distance of 15cm) and lowest noise by stone trimmer when only turned on (61.8dB at a distance of 2m). There was significant differences in noise levels of the equipment's used in dental laboratories and dental learning clinics (P =0.007). The highest noise level recorded in clinics was at pedodontic clinic (67.37dB).

Control at noise source

Application of muffles, Hand pieces should be well maintained Compressors should be fitted away from the work place. The design of the surgery should locate compressors, ultrasonic instrument cleaners and other equipment outside or in an isolated part, whereas the arrangement of the equipment inside the office should not result in an interference of sounds produced by them [11].

Control of transmission

Sound absorbing material wall Resilient floors sound proof acoustical ceiling sound- dampening materials ought to be used for finishing the walls and ceilings of offices [11].

Protection of Exposed Person

Simultaneous use of several turbines should be avoided dental drills should be kept 35cm away from ear. Ear plugs and muffs Audiography test periodically for early detection. The dentist should maintain a proper distance from the operating field. Kilpatrick recommends the distance from the dentist's eye to the patient's mouth to be 14 inches, i.e. about 35cm [4]. When the operator is closer, decibel rating increases. Miranda mentions other controllable variables: how the ear is oriented to the working field, the orientation of hand piece exhaust ports to the ears, and the position of the hand piece in relation to the mouth. The rotary instruments must be activated only when they are ready to be used [12].

Conclusion

The American Dental Association Council on Dental Research advised that dentists using high speed drills should have periodic hearing tests to monitor their hearing [13]. Further recommendations include minimizing non- occupational noise exposure and using a hearing protection device when exposed to loud sounds. Dental professionals can protect their hearing while at work by monitoring and/or changing the environment to decrease the effects of noise. To ensure that the effects of noise are diminished, using a hearing protection device when exposed to noisy dental equipment may prevent the occurrence of noise-induced hearing loss.

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