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ABSTRACT

Dental professionals are at significant risk of developing permanent hearing damage and systemic health complications due to their profession, yet most practitioners are not even aware that they are at risk. The aim of this article is to provide a comprehensive overview of the issue of noise-induced hearing loss in the dental profession, highlighting the essential points that demonstrate why clinicians are at risk while providing solutions to prevent it from occurring.

EDUCATIONAL OBJECTIVES

1. Demonstrate how noise-induced hearing loss is jeopardizing your career and overall health.
2. Examine how acute or chronic noise exposures can lead to long-term hearing issues.
3. Critique current hearing standards and their role in creating a false perception of safety.
4. Provide practical solutions to preserve your sense of sound and protect your systemic health.



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The true dental pandemic

Hearing loss and its silent role in affecting our careers and systemic health

A PEER-REVIEWED ARTICLE | by Sam S. Shamardi, DMD

Hearing loss is the most significant unaddressed threat to our careers as dental professionals.¹ Today, we have more personal protective equipment (PPE) and regulations than ever before. We are required by Occupational Safety and Health Administration (OSHA) and other standards to protect ourselves from exposure to blood, chemicals, solvents, and other biohazards. We can make the argument that our PPE serves to preserve one of our five senses: gloves protect

our hands and thus help preserve our sense of touch, masks cover our mouths and noses and protect our senses of smell and taste, and eye protection preserves our sight. We have now incorporated N95 masks as additional barriers against inhalation of COVID-related viruses. Yet, despite decades of evolution in PPE, regulatory mandates, and countless sources of literature warning us of the perils of our noisy working environment, our sense of hearing

has been completely ignored, to our great detriment.

Prevalence of hearing loss

If hearing loss were officially considered a disability, it would rank as the highest in the world,² affecting over 25% of the population.³ Over 48 million Americans suffer from advanced hearing loss, while an additional 30 million workers are exposed to hazardous noise on the job daily according to the Centers for Disease Control and Prevention (CDC).⁴ Noise-induced hearing loss (NIHL), which specifically targets dental professionals, is defined as a permanent hearing impairment resulting from prolonged exposure to high levels of noise.⁵

It is the most self-reported occupational illness/injury in the workforce and is an invisible problem that shows no signs of its presence until it has reached irreversible levels.⁶ It ranks as the third most common chronic health problem in the country after hypertension and arthritis, and its prevalence is more common than highly funded and publicized diseases such as cancer, diabetes, mental health, and asthma.⁷ Further, despite its prevalence, NIHL and hearing loss in general are widely uninsured issues, minimizing its publicity and adding to the financial burden it causes once identified.

Hearing loss issues are now starting at earlier ages than ever before thanks to advancements in technology. Past generations considered televisions and radios as luxuries, but today's children have more options than ever before, and the use of devices such as iPods have created a new wave of hearing issues from a younger age. As early as 2001, it was estimated that over 12% of children ages 6-19 had hearing impairment in one or both ears.⁸ Today, over 80% of elementary school children use personal music players⁹ for extended periods of

time, meaning their exposure starts at younger and younger ages, leading to hearing issues far sooner than prior generations and driving up the long-term ramifications. Thus, it begs the question: How can something so serious and so prevalent throughout our population receive so little attention?

Why hearing loss is not being addressed

A lack of screening is a major contributing factor; over one fifth of those above the age of 65 say they have never had a hearing test before, and only around 20% of adults have had their hearing checked in the last three years versus 60% having vision checks.¹⁰ Compare that with yearly medical visits, bloodwork, and wellness checkups, and it paints an unfortunate picture in which proper diagnosis cannot be achieved. Another important reason that hearing loss receives so little attention is that many careers have reduced exposure to dangerous levels of noise and are less at risk. Dentistry is not one of them.

According to the American Dental Association (ADA), dentists continue to work longer careers and retire at a later age.¹¹ The average dental career is now 35 years and rising, and including dental school and a possible residency program, the actual dental career is closer to 40 years in duration. If we know that NIHL specifically results from prolonged exposure to high levels of noise, the picture begins to be seen more clearly. A simple mathematical calculation shows a scary reality: a traditional five-days-a-week, eight-hour workday in the dental environment over the course of a typical career adds up to over 70,000 hours of exposure for the average dental professional. It's therefore no coincidence that our profession suffers badly from this issue, and we need to better educate

ourselves on the process of hearing loss itself and how we may protect ourselves.

Anatomy of the ear

To better understand NIHL and how it is established, one must first look to the anatomy of the ear. Our ears are anatomically divided into three sections: the external, middle, and inner ear. The external ear serves to collect and amplify incoming sounds and help determine which direction the sound is coming from.⁵ The middle ear contains the three tiny bones (incus, malleus, stapes) linking the eardrum to the inner ear. The vibrations from the eardrum cause the tympanic membrane to vibrate, and those vibrations then move into the inner ear.

The inner ear has two parts: the vestibular, which deals with balance, and the cochlea, which handles hearing. The cochlea has a snail shell appearance, and within this shell are hair cells and fluid. As the fluid moves due to the incoming vibrations from the eardrum, the hair cells move; this movement creates signals that translate to the auditory complex of the brain via the auditory nerve to the central nervous system, where the final processing of the sound is completed. With continuous levels of damaging sound from NIHL, the hair cells begin to vasoconstrict and become damaged, and once damaged, they cannot regenerate. It then requires a greater intensity of sound to reach hair cells deeper within the cochlea to translate noise, giving us the perception of hearing loss.

How NIHL occurs

The initial signs of hearing loss begin at the 4 kHz frequency, also known as the "4k notch," an identification indicator analogous to a 5 mm probing depth and periodontal disease. The hair cells that are damaged first are present in the area of the cochlea responsible for high-frequency sounds; that's why we

lose this range of hearing first.⁵ Upon initial exhaustion of the hair cells from a loud exposure, a muffling or ringing sensation will result. Picture a night out at a concert, and waking up to a muffled buzzing of your ears. This is known as the temporary threshold shift.¹² What we typically notice with this shift is that after a day or two in a quieter environment, the muffling disappears. Problem solved, right?

For decades within the audiology community, this was the narrative. But a groundbreaking study showed a totally different reality; it turns out that even a single incident of a temporary threshold shift can result in acute loss of cochlear nerve terminals and long-term delayed degeneration of the cochlear nerve.¹³ Not only can this damage not be measured via any hearing test, but the results may not be fully realized for years.

Stages of hearing loss

Hearing loss occurs in three stages. In stage one, we have temporary threshold shift incidents and hair cell permanent damage.¹² The individual cannot detect any changes with their hearing, nor can it be detected on a screening test. In stage two, high-frequency hearing is permanently lost, but typical speech and lower frequency hearing still appear normal. This change can be detected via a hearing test, but as established earlier, few people get checked regularly. By the time stage three is reached, both high- and low-frequency hearing are affected, and regular speech becomes difficult to discern.¹² The individual now realizes something is wrong, but by this point, damage is permanent and irreversible; hearing aids are the only solution.

Ironically, a similar tale occurs with our patients and dental care. We warn them about signs of infection and/or decay, and stress the need to act before it progresses, but a lack of pain makes patients hesitant, so they choose to

monitor the area until things progress to the point of acute pain and an emergency visit becomes necessary. Our frustration stems from a dedication to prevention, which, ironically, we do not apply to our own wellness and hearing loss.

Dentistry is a risk factor for hearing loss

NIHL is preventable, yet our regulatory bodies have not pushed hearing protection as the standard of care. Noise is considered to be dangerous at levels of 85 dB and higher.⁵ In context, 85 dB is relatively the environment where someone standing three feet away will not be able to hear you unless you raise your voice. While normal speech is in the 60-65 dB range, the bulk of dental equipment used daily easily exceeds the 85 dB range.^{14,15} The question is: How long can we be exposed to these sounds before they damage our ears?

OSHA, which carries the force of law, states that in a 90 dB environment, you can be exposed for a total of eight hours before causing damage. Conversely, the National Institute for Occupational Safety and Health (NIOSH), which uses scientific studies and data to determine values and is the only standard used by audiologists, states that for the same decibel level, we can only be exposed for two hours before causing damage.⁵ The difference in hearing standards is massive! We all are aware of OSHA but haven't known about NIOSH simply because they don't carry any legal enforcement. But it gets worse; both standards are based on a standard eight-hour day, five-day workweek and therefore assume our remaining 16 hours of the day and entire weekend are spent in a noise-free environment! The reality is that even the NIOSH standards are not strict enough, and the true amount of exposure time without harm is far less than the standards suggest. This combined with our daily exposure to noise in the

dental environment shows we are at significant risk.

The reason dental professionals are at such risk is that hearing loss is a *cumulative* issue over time⁵; while we may spend only 25 minutes per patient using the high-speed handpiece, suction, or ultrasonics, we do this *multiple times daily*, for an average career of 35 years. The literature has demonstrated endless studies clearly showing that our daily armamentarium far exceeds the permissible levels of decibel exposure.

In one study done by an audiologist at a dental school, the data showed high-speed handpiece and ultrasonic instrument levels ranging from 95-102 dB or, according to NIOSH, an average total exposure limit of only 30 minutes per day.¹⁴ Another meta-analysis done in Europe also showed an average decibel exposure in dental clinics of 91 dB, with a total cumulative daily drilling time of approximately two hours, exactly matching the permissible NIOSH standards.¹⁶

Studies on hygienists have shown those practicing for over 20 years with ultrasonics have hearing levels equivalent to an average citizen three decades older,¹⁷ and compared to other health professionals, dentists have significantly worse hearing.^{9,25} This holds true for all ages and genders compared to the general population.¹⁸ Our hearing capacity as a whole is equivalent to people decades older than we are,⁵ and each member of the dental team from specialist to lab tech to assistant is similarly affected.¹⁹

Systemic results of hearing loss

While the relationship of the risk of NIHL and our professional career is more obvious, the significant systemic health effects that NIHL causes are completely overlooked. Exposure to chronic noise can lead to significant systemic health issues such as cardiovascular disease and depression.²⁰ It reduces productivity, increases

stress, and interferes with concentration.²¹ This insult results in both sympathetic and endocrine responses, deteriorating our overall health in the long term.²¹

Consider some daily scenarios we are all familiar with: At a stoplight, the car behind you aggressively honks their horn and yells at you when the light turns green. In response, you get angry and honk back. This response initiates an increase in blood pressure and anger in the acute phase, activating your endocrine system via adrenaline. As an isolated episode, the risks are minimal, but done on a more chronic basis, this constant endocrine activation can lead to long-term heart disease.

Another example is noise exposure occurs when we're trying to sleep. Oftentimes, we like to say that we are capable of "sleeping through anything," but the reality is more complicated. High noise disturbances, from a passing ambulance, loud group of people, or an unruly neighbor, will create microdisturbances that may wake us for a brief moment and disturb our deep sleep, again activating the endocrine system. With time, we notice that our sleep quality and quantity are reduced, which in the acute phase affect our productivity at work and also can cause hypertension.²¹ Chronic episodes to these noise disturbances can result in long-term cardiac issues.²¹

One study highlights how workers with average career spans of 35 years (matching the average dental career) and prolonged moderate or severe noise exposure had an increased incidence of cardiovascular death.²² Even pregnant women exposed to chronic noise are found to have significantly higher incidence of premature births and low-birth-weight babies²³; thus the systemic health risks NIH carry cannot be overlooked.

Preventing hearing loss

Our best counter to this risk is prevention via hearing protection. The ADA and endless publications have recommended hearing protection since 1974; why have we ignored the warnings?¹⁵ Our options in the past were very limited.

Traditional foam plugs result in significant muffling of sounds and the inability to communicate; studies show this as the primary reason protection has been avoided.¹⁷ They are very useful when it comes to increased attenuation (lowering of decibels), but the amount of reduction is too extreme. Solutions like noise-canceling headphones are not practical for our environment, and again eliminate communication. Thus, it is evident that we not only require something that provides us protection, but also something that doesn't cut us off from our environment and affect our ability to communicate with patients and staff.

The first positive step in that direction came with the introduction of passive ear technology. By incorporating a filter within the plug that can utilize different levels of attenuation, the amount of muffling compared to traditional foam is improved while still providing protection. These plugs also can be made to custom fit an individual's ear via a mold, further improving fit and function. While passive plugs with filters are a definite improvement, they still filter *all* sounds that pass through the ear, whether or not they cause damage.^{1,24} This means that normal conversation, which falls well below the danger level, will be equally attenuated as any sound within the danger zone, resulting in increased difficulty communicating.

As dental professionals, what we require is something that protects us from hearing damage while simultaneously preserving our ability to hear and communicate with patients and staff. This technology is known

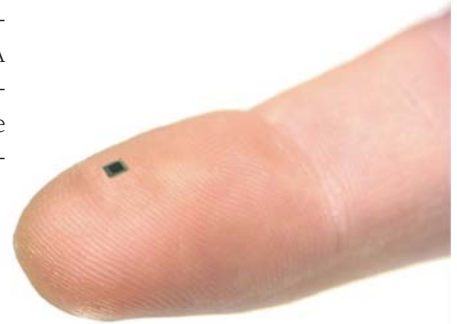


FIGURE 1. Active hearing protection utilizes microchips and other advanced technology to instantaneously identify damaging sounds and compress them to safer levels, while still allowing for 100% HD communication and an "open ear" response. Note the size of the microchip relative to the tip of the finger.

as active hearing protection.^{24,25} Using a tiny electronic microchip located within the plug itself, the damaging sounds from the environment are instantly isolated and compressed to lower levels while still maintaining an "open ear" response, resulting in 100% HD hearing (figure 1).^{1,25} Hearing damage is prevented, and communication remains unaffected. This technology gives us a solution to solve noise exposure issues.

The first active hearing protection product for the dental professional, known as DI-15 (currently EarAid), was first introduced at the Greater New York Dental Conference in 2014 (figure 2). It provided 15 dB of attenuation; thus working in an environment of 100 dB would be lowered down to 85 dB, increasing permissible exposure time significantly without affecting normal sounds. The 15 dB attenuation was chosen based on the literature and audiology recommendations.¹⁴ The product successfully underwent an intensive two-year ADA Professional Product Review where it earned top marks; yet despite the scientific and clinical affirmation from the ADA and multiple publications,²⁵ our profession underutilizes the product.

Products such as the EarAid and other comparable products are

powerful preventive tools for the dental profession. Other supplementary methods of prevention include regular hearing tests, utilizing electric versus air-driven handpieces, minimizing exposure outside of the workplace, and trying traditional foam or passive plugs. Stock plugs and other OTC devices are not nearly as effective as electronic protection, but some level of protection is better than none at all.

It's time we take a stand and begin seriously addressing dentistry's true pandemic. While we continue to fret over the newest bonding agents and software platforms, we continue losing our hearing daily. The responsibility to take action is ours. Twenty years ago the idea of dental loupes was considered radical and the clinical adjustments and applications unrealistic; today it's considered the standard of care in all teaching institutions and globally accepted for clinical use. The premise of requiring N95 masks as an additional layer of protection would have been laughed off in 2019; today it has become a standard form of PPE and something we all have adjusted to using despite the added difficulties in breathing and discomfort.

So why is the idea of incorporating hearing protection still so taboo? Decades of literature, tens and thousands

of our peers affected, and serious systemic health risks have not changed our approach to the biggest silent killer in all of dentistry. Certainly, the introduction of an added form of PPE will meet initial hesitation, but nothing has the significant all-around impact of NIHL on our professional career and overall health. Ultimately, it's not a question of if, but rather when and how much our hearing and quality of life will be affected by dentistry. Ask yourself a simple question: How much do you value your hearing?

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FIGURE 2. EarAid (previously DI-15) was developed specifically for the dental environment and has been tested by an ADA Professional Product Review and recognized as a top product winner.

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QUESTIONS

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- If hearing loss were considered a disability, it would rank as ___ in the world.
 - Second
 - Third
 - First
 - Fifth
- Hearing loss affects approximately what percentage of the population?
 - 20%
 - 25%
 - 30%
 - 40%
- NIHL is the ___ most reported occupational illness/injury in the workforce.
 - Third
 - First
 - Second
 - Fifth
- Hearing loss ranks as the ___ most common chronic health condition in the US.
 - First
 - Second
 - Third
 - Fourth
- Approximately what percentage of children ages 6-19 have hearing impairment issues?
 - 5%
 - 12%
 - 18%
 - 25%
- What percentage of adults state they haven't had a hearing test in the last three years?
 - 10%
 - 15%
 - 20%
 - 25%
- What percentage of adults above the age of 65 state they have never had a hearing test?
 - 1/5
 - 2/5
 - 3/5
 - 4/5
- According to the ADA, the average dental career is approximately how long?
 - 25 years
 - 35 years
 - 40 years
 - It never actually ends.
- Where is the portion of the ear responsible for hearing found?
 - Outer ear
 - Middle ear
 - Inner ear
 - It cannot be identified.
- The specific area within the ear responsible for hearing that has a snail-like shape is called:
 - Cochlea
 - Malleus
 - Incus
 - Ear drum
- The external ear serves which primary purpose?
 - Translation of sound
 - Processing of sound
 - Production of sound
 - Amplification of sound
- What type of cells is found within the cochlear fluid?
 - Ear cells
 - Tympanic cells
 - Listening cells
 - Hair cells
- When damaged, hair cells start to:
 - Regenerate
 - Oxygenate
 - Vasoconstrict
 - Expand
- Once damaged, ___ intensity of sound is required to reach hair cells within the cochlea.
 - Less
 - Similar
 - Equal
 - Greater
- The initial signs of hearing loss begin at what frequency?
 - 1 kHz
 - 2 kHz
 - 3 kHz
 - 4 kHz
- Initial exhaustion of hair cells leading to a muffling sensation is known as:
 - Temporary hearing shift
 - Temporary adjustment shift
 - Temporary threshold shift
 - Temporary exhaustion shift
- At which stage can hearing loss be detected via testing?
 - Stage one
 - Stage two
 - Stage three
 - None of the above

18. At which stage are high-frequency sounds completely lost?

- A. Stage one
- B. Stage two
- C. Stage three
- D. None of the above

19. What decibel level is considered the baseline for dangerous exposure?

- A. 85 dB
- B. 90 dB
- C. 95 dB
- D. 100 dB

20. Normal speech is typically within what decibel range?

- A. 60-65
- B. 65-70
- C. 70-75
- D. 75-80

21. Which hearing standard is based on scientific studies and considered the gold standard?

- A. OSHA
- B. ADA
- C. ADHA
- D. NIOSH

22. Both NIOSH and OSHA standards are based on what time interval?

- A. 24 hours/day, 7 days/week
- B. 8 hours/day, 5 days/week
- C. 12 hours/day, 5 days/week
- D. 8 hours/day, 7 days/week

23. Literature shows that dental instrumentation ___ safe levels of exposure.

- A. Matches
- B. Reduces
- C. Exceeds
- D. Has no influence on

24. Compared to other health professionals, the average dentist has ___ hearing levels.

- A. Better
- B. Similar
- C. Worse
- D. It's still unknown

25. Which group of dental professionals is affected by hearing damage within dentistry?

- A. General dentists
- B. Specialists
- C. Hygienists
- D. All of the above

26. NIHL is responsible for each of these systemic issues except:

- A. Cardiovascular disease
- B. Depression
- C. Low pre-term birth weight
- D. Cancer

27. The primary reason that clinicians don't use hearing protection is:

- A. Cost
- B. Looks
- C. Communication
- D. Function

28. Passive hearing protection utilizes ___ to provide protection.

- A. Filters
- B. Microchips
- C. Natural air
- D. Lasers

29. Active hearing protection is the gold standard for dental professionals because it allows for:

- A. Protection with clear communication
- B. Protection with partial communication
- C. No protection with clear communication
- D. No protection and no communication

30. According to literature and data, what level of protection would be considered ideal for the dental environment?

- A. 10 dB
- B. 15 dB
- C. 20 dB
- D. 25 dB

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CITY: _____ STATE: _____ ZIP: _____ COUNTRY: _____

TELEPHONE (PRIMARY): _____ TELEPHONE (OFFICE): _____

REQUIREMENTS FOR OBTAINING CE CREDITS BY MAIL/FAX: 1) Read entire course. 2) Complete info above. 3) Complete test by marking one answer per question. 4) Complete course evaluation. 5) Complete credit card info or write check payable to Endeavor Business Media. 6) Mail/fax this page to DACE.

If you have any questions, please contact dace@endeavorb2b.com or call (800) 633-1681. A score of 70% or higher is required for CE credit.

COURSE CAN ALSO BE COMPLETED ONLINE AT A LOWER COST. Scan the QR code or go to dentalacademyofce.com to take advantage of the lower rate.



EDUCATIONAL OBJECTIVES

1. Demonstrate how noise-induced hearing loss is jeopardizing your career and overall health.
2. Examine how acute or chronic noise exposures can lead to long-term hearing issues.
3. Critique current hearing standards and their role in creating a false perception of safety.
4. Provide practical solutions to preserve your sense of sound and protect your systemic health.

COURSE EVALUATION

1. Were the individual course objectives met?
Objective #1: Yes No Objective #3: Yes No
Objective #2: Yes No Objective #4: Yes No

Please evaluate this course by responding to the following statements, using a scale of Excellent = 5 to Poor = 0.

- | | | | | | | |
|--|-----|----|---|---|---|---|
| 2. To what extent were the course objectives accomplished overall? | 5 | 4 | 3 | 2 | 1 | 0 |
| 3. Please rate your personal mastery of the course objectives. | 5 | 4 | 3 | 2 | 1 | 0 |
| 4. How would you rate the objectives and educational methods? | 5 | 4 | 3 | 2 | 1 | 0 |
| 5. How do you rate the author's grasp of the topic? | 5 | 4 | 3 | 2 | 1 | 0 |
| 6. Please rate the author's effectiveness. | 5 | 4 | 3 | 2 | 1 | 0 |
| 7. Was the overall administration of the course effective? | 5 | 4 | 3 | 2 | 1 | 0 |
| 8. Please rate the usefulness and clinical applicability of this course. | 5 | 4 | 3 | 2 | 1 | 0 |
| 9. Please rate the usefulness of the references. | 5 | 4 | 3 | 2 | 1 | 0 |
| 10. Do you feel that the references were adequate? | Yes | No | | | | |
| 11. Would you take a similar course on a different topic? | Yes | No | | | | |

12. If any of the continuing education questions were unclear or ambiguous, please list them.

13. Was there any subject matter you found confusing? Please describe.

14. How long did it take you to complete this course?

15. What additional dental continuing education topics would you like to see?

Mail/fax completed answer sheet to:

Endeavor Business Media

Attn: Dental Division; 7666 E. 61st St. Suite 230, Tulsa, OK 74133
Fax: (918) 831-9804

Payment of \$69 is enclosed (this course can be completed online for \$39. Scan the QR code or go to dentalacademyofce.com to take advantage of the lower rate).

Make check payable to Endeavor Business Media

If paying by credit card, please complete the following:

MC Visa AmEx Discover

Acct. number: _____

Exp. date: _____ CVC #: _____

Billing address: _____

Charges on your statement will show up as Endeavor.

- | | |
|---|---|
| 1. <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D | 16. <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D |
| 2. <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D | 17. <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D |
| 3. <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D | 18. <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D |
| 4. <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D | 19. <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D |
| 5. <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D | 20. <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D |
| 6. <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D | 21. <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D |
| 7. <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D | 22. <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D |
| 8. <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D | 23. <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D |
| 9. <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D | 24. <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D |
| 10. <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D | 25. <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D |
| 11. <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D | 26. <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D |
| 12. <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D | 27. <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D |
| 13. <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D | 28. <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D |
| 14. <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D | 29. <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D |
| 15. <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D | 30. <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D |

CUSTOMER SERVICE: (800) 633-1681

EXAM INSTRUCTIONS. All questions have only one answer. If mailed or faxed, grading of this examination is done manually. Participants will receive confirmation of passing by receipt of a Verification of Participation form. The form will be mailed within two weeks after receipt of an examination.

COURSE EVALUATION AND FEEDBACK. We encourage participant feedback. Complete the evaluation above and e-mail additional feedback to Rachel McIntyre (rmcintyre@endeavorb2b.com) and Laura Winfield-Roy (lwinfield@endeavorb2b.com).

COURSE CREDITS AND COST. All participants scoring 70% or higher on the examination will receive a verification form for three (3) continuing education (CE) credits. Participants are urged to contact their state dental boards for CE requirements. The cost for courses ranges from \$20 to \$110.

CANCELLATION AND REFUND POLICY. Participants who are not 100% satisfied can request a refund by contacting Endeavor Business Media in writing.

RECORD KEEPING. Endeavor Business Media maintains records of your successful completion of any exam for a minimum of six years. Please contact our offices for a copy of your CE credits report. This report, which will list all credits earned to date, will be generated and mailed to you within five business days of receipt.

IMAGE AUTHENTICITY. The images in this educational activity have not been altered.

PROVIDER INFORMATION. Endeavor Business Media is an ADA CERP-recognized provider. ADA CERP is a service of the American Dental Association to assist dental professionals in identifying quality providers of continuing dental education. ADA CERP neither approves nor endorses individual courses or instructors, nor does it imply acceptance of credit hours by boards of dentistry. Concerns about a CE provider may be directed to the provider or to ADA CERP at ada.org/cefp.

Endeavor Business Media is designated as an approved PACE program provider by the Academy of General Dentistry. The formal continuing dental education programs of this program provider are accepted by the AGD for fellowship, mastership, and membership maintenance credit. Approval does not imply acceptance by a state or provincial board of dentistry or AGD endorsement. The current term of approval extends from 11/1/2019 to 10/31/2024. Provider ID# 320452. AGD code: 130.

Dental Board of California: Provider RP6933. Course registration number CA code: 03-5933-22156. Expires 7/31/2024. *This course meets the Dental Board of California's requirements for three (3) units of continuing education.*

Endeavor Business Media is designated as an approved provider by the American Academy of Dental Hygiene Inc. #AADHPNW (January 1, 2022 - December 31, 2024). Approval does not imply acceptance by a state or provincial board of dentistry. Licensee should maintain this document in the event of an audit.