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The down and dirty side of dentistry: Infection prevention that saves lives!

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Abstract

Dental offices throughout the United States have received negative press when infection control violations occur. These violations can be so egregious that they result in patient death. Licensed dental providers have an obligation to keep their patients and the public safe while under their care. They also need to protect their own health while working in a hazardous profession with a high risk of exposure to disease, radiation, and other environmental contaminants. This topic is so important in dentistry that many state boards now require an infection prevention course for licensure. This course will explore the current recommendations for personal protective equipment and environmental controls for aerosols, radiation, clinical and housekeeping contact surfaces, as well as waterline maintenance.

Educational objectives

At the conclusion of this course, the dental provider will be able to:

1. Understand the importance of hand hygiene and personal protective equipment that is needed to ensure the safety of patients and themselves.
2. Control aerosols produced during dental procedures based on the Centers for Disease Control and Prevention recommendations.
3. Minimize risk of injury through controlling environmental hazards such as radiation exposure and when disinfecting clinical and housekeeping contact surfaces.
4. Understand the importance of dental waterline maintenance.



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Introduction

Business Insider ranked dental professionals in the top five riskiest and most unhealthy professions in 2017. The company used data from the Occupational Information Network, which is a US Department of Labor database, in their reporting.¹ Nine hundred seventy-four occupations were assessed in the United States and ranked on the basis of exposure to contaminants, exposure to disease and infection, exposure to hazardous conditions, exposure to radiation, risk of minor burns, cuts, bites, or stings, and/or time spent in sitting positions.¹ Dental hygienists were ranked number one, general dentists were number two, and dental assistants were the number five riskiest and most unhealthy of the 974 professions evaluated.¹

The risk to dental providers' health and wellness is real. Now the question is how to protect oneself against what *Business Insider* found to be dentistry's highest health risks. Those specifically listed were a high exposure to disease and infections, exposure to radiation, and exposure to contaminants.

The answer to protection from these hazards is compliance with infection prevention protocols as recommended by the Centers for Disease Control and Prevention (CDC), American Dental Association (ADA), Environmental Protection Agency (EPA), Federal Drug Administration (FDA), and enforced by the Occupational Safety and Health Administration (OSHA). This course will explore current recommendations for hand hygiene, personal protective equipment (PPE), environmental controls of aerosols, radiation, clinical and housekeeping contact surfaces, as well as waterline maintenance to reduce what *Business Insider* found to be dentistry's highest health risks.

Hand hygiene

Hand hygiene is the single most important factor in preventing the spread of pathogens in a health-care setting.² Hand hygiene is indicated after patient contact or after contact with potentially contaminated inanimate objects. In addition, hand hygiene should be performed whenever hands are visibly soiled, before donning and after removing gloves, and before donning new gloves if swapping them out during a procedure.³ Hand hygiene should occur every time a provider leaves a patient room.³

There are options when selecting products for hand hygiene. The FDA issued a final ruling in 2016 establishing that over-the-counter consumer antiseptic wash products containing certain active ingredients can no longer be marketed, and these products are not designed for health-care use.⁴ For routine dental procedures, such as examinations and nonsurgical procedures, antimicrobial soap and water can be used.³ If hands are not visibly soiled, hand rubs containing 60%–95% isopropanol or ethanol alcohol, chlorhexidine, quaternary ammonium compounds, or octenidine can be used because they are rapidly germicidal.² If a hand rub is used, the amount recommended by the manufacturer must be applied and the hand rub used until it thoroughly dries on the hands.²

The CDC recommends fingernails be kept short and free from nail polish and acrylic nails.² Fingernails harbor bacterial flora, and acrylic nails have been epidemiologically linked to multiple disease outbreaks in the health-care setting.²

Personal protective equipment

The CDC is the leading agency that issues recommendations for when and what PPE should be used to prevent exposure to infectious diseases, and OSHA regulates the requirements that employers must follow to protect employees. Both recommendations and requirements will be discussed below.

GOWNS AND LAB COATS

OSHA's bloodborne pathogens standards require that disposable gowns or lab coats have a length down to the knees with sleeves long enough to cover the forearms and wrists, and be made of materials that are fluid-resistant.² Gowns should be changed when visibly soiled and removed before leaving the operator.^{2,3} OSHA mandates that employers ensure that PPE is disposed of or appropriately laundered.² Employers must also provide a washer and dryer in-office or have an off-site delivery laundry service to handle contaminated nondisposable items. These items must be stored in a labeled or color-coded container in the office until it is picked up by a service.² Contaminated laundry may not be taken home to be laundered.²

EYE WEAR

Appropriate eye wear (face shield, glasses, or loupes with side shields) must be worn whenever there is a potential for splashes, sprays, or spatter containing blood, saliva, or other bodily fluids.^{2,3} This includes working in sterilization areas and when breaking down or setting up a dental operator. Face shields protect against aerosols and airborne microorganisms and particles.² When a face shield is worn, an approved mask must still be worn for full protection.³

MASKS

A surgical mask should be worn by all dental professionals and is defined by the CDC as a mask with "at least 95% bacterial filtration efficiency, and also protects the dental health-care worker from large-particle droplet spatter that might contain bloodborne pathogens or other infectious microorganisms."² When selecting a mask, the provider should be familiar with four terms: particle filtration efficiency (PFE), bacterial filtration efficiency (BFE), fluid resistance, and breathability.

PFE refers to the percent efficiency at which the mask filters out particulate matter.² BFE measures the percent efficiency of the mask in filtering microorganisms. *Staphylococcus aureus* is the bacteria used in the testing due to its small size.³ Fluid resistance is measured by spraying synthetic blood onto the mask and evaluating for penetration. Breathability of masks is reported as a Delta P parameter. The Delta P lets you know how easily air will pass through the mask for breathability.²

The American Society for Testing and Materials (ASTM) is a nonprofit organization that uses four factors in their ranking and safety recommendations of masks. (See Table 1.) Take notice of the varying fluid resistance, PFE, BFE, Delta P ratings as well as the recommendations for procedures.

When selecting a surgical mask, it is important to consider what procedures are to be performed as noted in Table 1. Masks should be changed when the outer or inner surface becomes moist from either oral fluids, exhaled air by the clinician, or touching the outer portion of the mask with a contaminated glove.² When this occurs, airflow through the mask increases and the clinician is more susceptible to disease transmission.²

TABLE 1: ASTM factors for ranking and safety recommendations of masks

ASTM Level	Performance ⁵	Procedure recommendations ⁵	Dental procedure recommendations ⁶
ASTM level 3	High fluid resistance (160 mm Hg) PFE ≥ 98% BFE ≥ 98% Delta P < 5.0 mm H ₂ O/cm ²	Recommended for procedures where heavy to moderate amounts of fluid, spray, and/or aerosols are produced	Ultrasonic, air polishing, crown preps, implant placement, surgical procedures
ASTM level 2	Moderate fluid resistance (120 mm Hg) PFE ≥ 98% BFE ≥ 98% Delta P < 5.0 mm H ₂ O/cm ²	Recommended for procedures where moderate to light amounts of fluid, spray, and/or aerosols are produced	Restorative composites, endodontics, hand scaling procedures (prophy or scaling and root planing), sealants
ASTM level 1	Low fluid resistance (80 mm Hg) PFE ≥ 95% BFE ≥ 95% Delta P < 4.0 mm H ₂ O/cm ²	Recommended for procedures where low amounts of fluid, spray, and/or aerosols are produced	Patient exam, operatory clean-up, lab trimming, impressions

At minimum, masks should be changed between patients or even during a procedure when contamination occurs.^{2,3} Providers should remove a mask with ungloved hands by the ear loops and avoid touching the inside or outside of the mask.³

GLOVES

Gloves should not be washed, disinfected, or sterilized before use.² They are single-use and should be discarded as soon as possible after use.² They are the last piece of PPE donned by providers before entering a patient’s mouth.³ They are always placed after hand hygiene is performed and hand hygiene is repeated when they are removed.³ The type of glove to be worn depends on the procedure. (See Table 2.)

Gloves can be latex or nonlatex (neoprene, block copolymer, vinyl, nitrile).³ When working with a patient with a known hypersensitivity or allergy to latex, only latex-free materials should be selected for use. “Latex sensitivity is due to the protein allergens and to additives used when the commercial latex is prepared.”³ During

dental procedures, it is common for gloves to contact multiple materials and chemicals that can compromise the integrity of latex gloves.² For example, petroleum jelly and products made with alcohol can break down glove integrity.³ Latex gloves can even compromise the setting of various impression materials.² Providers should check with their glove manufacturer’s recommendations and directions for use for more specific details.

Environmental controls

AEROSOLS

Aerosols (particles <50 μm) and spatter (particles >50 μm) are generated from multiple dental procedures when using high-speed handpieces, air polishers, ultrasonic scalars, and even when rinsing a patient’s mouth with an air or water syringe.³ Aerosols and spatter are airborne particles that can contain contaminants such as blood, saliva, bacteria, or viruses from a patient’s oral cavity.³ Due to the small size of aerosols, they have the capability of being suspended in the air for long periods of time,

and studies have shown their ability to travel eight feet away from the source during procedures.^{3,7,8} Viruses can live outside of their host and on inanimate surfaces for varying lengths of time as demonstrated in Table 3. This information demonstrates the importance of aerosol control in the dental environment.

Dental clinicians should follow these steps to reduce their risk from potentially dangerous dental aerosols. All PPE must be worn in the prescribed manner as described above, making especially sure the correct level of mask is selected for aerosol procedures. Remember, only level 3 masks are recommended any time high-speed drills, ultrasonics, or air polishers are used during patient procedures. Preprocedural rinses should be used in addition to high-volume evacuation (HVE) to control aerosols.

Preprocedural rinses not only decrease the number of microorganisms in aerosol production, but also decrease the number of microorganisms in a patient’s bloodstream during invasive procedures.² Antimicrobial rinses with either chlorhexidine gluconate, essential oils, or povidone-iodine are encouraged by the CDC.²

In order for a suction system to be classified as an HVE, it must remove a large volume of air within a short period of time.¹⁴ Typically, HVE used in dentistry has an 8 mm bore hole and attaches to an evacuation system that will remove up to 100 cubic feet of air per minute.¹⁴ “The use of a high-volume evacuator has been shown

TABLE 3: Time durations viruses can live outside of their host

Virus	Survival time outside host
Influenza ⁹	24–48 hours
Ebola ¹⁰	6 days
Herpes (HSV-1, HSV-2) ¹¹	7 days
Hepatitis B (HBV) ¹²	7 days
HIV ¹¹	7 days+
Hepatitis C (HCV) ¹³	6 weeks
<i>Mycobacterium tuberculosis</i> (TB) ¹¹	4 months
<i>Candida albicans</i> ¹¹	4 months
MRSA ¹¹	7 months

TABLE 2: Type of glove used depends on procedure

Patient examination gloves	Patient care, examinations, nonsurgical procedures, laboratory procedures
Surgical gloves	Surgical procedures Must meet FDA standards for sterility Less likely to harbor pathogens as compared to examination gloves
Nonmedical gloves	Utility/industrial/general purpose gloves—puncture-resistant Not a medical device regulated by FDA, not for patient care Housekeeping procedures (cleaning, disinfecting) Handling sharps or chemicals Sanitize after use

to reduce the contamination arising from the operative site by more than 90%.¹⁴ There are multiple devices on the US market for HVE. Providers should review the design and manufacturer claims prior to selecting a device to ensure appropriate protection and compliance with this CDC recommendation.

RADIATION

Dental professionals have different resources they can turn to when evaluating best practices on radiology protocols. The National Council on Radiation Protection (NCRP), the American Dental Association's Council on Scientific Affairs, and the EPA are examples of reputable resources. The NCRP lists ways to reduce patient exposure to radiation through the use of filtration, rectangular collimators, and kVp settings of 60–70.^{15,16} The NCRP also recommends the use of digital sensors or F-speed film with aiming devices that increase the likelihood of a good image on the first exposure.^{15,16} Clinicians should stand six feet away when taking an image to protect themselves from exposure.¹⁷

All patients should wear well-fitting radiation aprons. For intraoral exposures, patients should wear aprons with thyroid collars. Panoramic aprons do not have collars as they interfere with the x-ray beam of the machine as it rotates, but they do protect the patient's back. The ADA and NCRP recommend all aprons be evaluated for damage (tears, folds, cracks) monthly using visual and manual inspections.^{15,16} If damage is identified, the apron should be disposed of according to state laws. The NCRP also recommends a fluoroscopic examination for hidden defects annually.¹⁵ Aprons should be hung in between use and not folded as this has the potential to cause inner and outer materials to crack and break. Cracks in materials expose everyone in the office to the inner materials (lead, antimony), no longer offer protection to the patient, and allow radiation to pass through. Always follow manufacturer recommendations when disinfecting aprons after patient use.

When taking radiographs, providers should wear PPE. Masks, gowns, and eye wear protect from potential saliva spatter. Gloves offer protection while handling

contaminated films and sensors. While using film, providers need to be cautious of the possibility for cross-contamination between the outside and inside of the film packet. Radiography equipment used (tube head, handheld devices, film, sensors, aiming devices) should be protected with surface barriers that are changed after each patient and disinfected with an EPA-registered, hospital-grade (intermediate-level) solution.^{2,18} Equipment that comes in contact with mucous membranes is considered semicritical and should be sterilized in between patients. According to the CDC, "Semi-critical items that cannot be reprocessed by heat sterilization should, at a minimum, be barrier protected by using an FDA-cleared barrier to reduce gross contamination during use."²

WATERLINE MAINTENANCE

According to the CDC, "Dental unit waterlines promote bacterial growth and development of biofilms due to the presence of long narrow-bore tubing, inconsistent flow rates, and the potential for retraction of oral fluids."² Studies have demonstrated that dental waterlines can become colonized with microorganisms, including bacteria, fungi, and protozoa.² "These microorganisms colonize and replicate on the interior surfaces of the waterline tubing and form a biofilm, which serves as a reservoir that can amplify the number of free-floating (i.e., planktonic) microorganisms in water used for dental treatment."² Pathogenic microorganisms such as *Pseudomonas aeruginosa*, *Legionella* species, and nontuberculous *Mycobacterium* species have been isolated from dental water systems and have been shown to cause sickness and even death in patients.² There are specific guidelines that must be followed to ensure the safety of dental health personnel as well as the public.

The EPA has set standards for safe drinking water quality and limits heterotrophic bacteria to less than 500 colony-forming units (CFU) per mL of drinking water.² The number of CFU used in nonsurgical dental procedures should be as low as reasonably achievable and at a minimum below the 500 CFU threshold set by the EPA.² Dental providers must follow water control standards to ensure the safety of the public whom they serve. Waterlines must

receive daily treatment and routine testing because research has demonstrated that microbial counts can reach over 200,000 CFU/mL within five days after the installation of new dental unit waterline.² Independent reservoirs or water bottle systems do not prevent the buildup of biofilm by themselves.² Dental providers can monitor water quality with either commercially available in-office test kits that can be read chairside or through water-testing laboratories.² The CDC does not give guidelines on the frequency of testing because that will vary based on the system being used.² Providers should refer to their state board rules and regulations as well as manufacturer directions for use to determine their testing frequency best-practice protocols.

Evacuation lines must be treated with an evacuation line cleaner. Line cleaners remove deposits and debris from the evacuation lines and help prevent the buildup of deposits. Dental providers should check with their state boards to determine what pH solution is required on their lines. Local EPA authorities have regulations on the pH permitted of evacuation line cleaners being discharged into the wastewater; however, some states have set their own pH ranges.²

The CDC recommends flushing dental waterlines at the start of each day and in between patients.^{2,3} Most new dental units are engineered to prevent the retraction of oral fluids, but some older dental units may have antiretraction valves that require maintenance. Regardless, flushing the lines is recommended and can help save lives.

CLINICAL CONTACT SURFACES

Clinical contact surfaces are surfaces directly touched by contaminated items such as gloves, contaminated skin, aerosols, spatter, instruments, containers, or other objects used during patient care.¹⁸ Because the risk of disease transmission is greater for clinical contact surfaces than for housekeeping surfaces, the CDC recommends clinicians wear all PPE when cleaning and disinfecting.¹⁸ Common examples of clinical contact surfaces in a dental operatory are light handles, switches on chairs, countertops, bracket trays, dental chairs, unit tables, and radiographic equipment. Many of these surfaces can be given barriers with a material that is impervious to

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QUESTIONS

- Which of the following professions was ranked number one riskiest profession in the United States by Business Insider in 2017?
 - General dentist
 - Dental hygienist
 - Dental assistant
 - Administrative staff
- Which of the following is the single most important factor in preventing the spread of pathogens in a health-care setting?
 - Hand hygiene
 - Wearing gloves
 - Wearing a mask
 - Wearing a protective gown
- What chemicals are considered rapidly germicidal by the FDA and recommended to be used in hand rubs in the health-care setting?
 - 60%–95% isopropanol
 - Chlorhexidine
 - Quaternary ammonium compounds
 - All of the above
- Which of the following is required by OSHA regarding disposable gowns and lab coats used in health care?
 - Sleeves long enough to cover forearms and wrists
 - Knee-length
 - Fluid-resistant
 - All of the above
- Which of the following is false?
 - Employees are responsible for laundering their own contaminated uniforms at home.
 - OSHA mandates that employers ensure that PPE is disposed of or appropriately laundered.
 - Employers must provide a labeled or color-coded container to house contaminated uniforms when using an offsite laundry service.
 - Gowns should be removed prior to leaving an operating room.
- What percentage of bacterial filtration efficiency (BFE) is the minimum standard set by the CDC to classify a mask as a surgical mask?
 - 55%
 - 88%
 - 92%
 - 95%
- Which bacteria is used when testing BFE?
 - Staphylococcus aureus
 - Mycobacterium tuberculosis
 - Streptococcus mutans
 - Streptococcus salivarius
- When should a mask be changed?
 - Inner surface becomes moist from expelled air
 - Clinician touched the outside of the mask with a dirty glove
 - In between every patient
 - A mask should be changed when any of the above occur.
- What ASTM level mask is considered moderately fluid resistant?
 - ASTM level 1
 - ASTM level 2
 - ASTM level 3
 - None of the above
- Which ASTM level mask should be worn when a provider is using an ultrasonic scaler?
 - ASTM level 1
 - ASTM level 2
 - ASTM level 3
 - ASTM level 4
- Which ASTM level mask should be worn when a provider is performing a routine dental examination?
 - ASTM level 1
 - ASTM level 2
 - ASTM level 3
 - ASTM level 4
- Which ASTM level mask should be worn when a provider is performing an endodontic procedure?
 - ASTM level 1
 - ASTM level 2
 - ASTM level 3
 - ASTM level 4
- What ASTM level mask has a PFE and a BFE \geq 98%?
 - ASTM level 1
 - ASTM level 2
 - ASTM level 3
 - Both B & C
- Which glove is not considered a device regulated by the FDA and, therefore, should never be used for patient care?
 - Surgical glove
 - Patient examination glove
 - Utility glove
 - None of the above

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QUESTIONS

15. Which of the following could be contained in a dental aerosol?
- Blood
 - Bacteria
 - Virus
 - All of the above
16. Which instrument can produce visible sprays in the dental environment?
- Handpiece
 - Air/water syringe
 - Ultrasonic
 - All of the above
17. Which can live on a surface for four months?
- Mycobacterium tuberculosis*
 - Hepatitis B
 - Hepatitis C
 - Influenza
18. Which can live on a surface for only 24–48 hours?
- Mycobacterium tuberculosis*
 - Influenza
 - MRSA
 - Candida albicans*
19. What percentage of aerosol contamination can be reduced by using a high-volume evacuator chairside?
- 35%
 - 75%
 - 90%
 - 100%
20. Which of the following is recommended by the NCRP to reduce patient exposure to radiation?
- Use a kVp setting of 90
 - Avoid using collimation
 - Use an aiming device
 - Use D-speed film
21. Which of the following x-rays would a patient not have a thyroid collar for?
- Maxillary molar periapical
 - Panoramic image
 - Mandibular anterior periapical
 - Mandibular molar periapical
22. What PPE does not have to be worn when capturing a radiology image?
- Mask
 - Gown
 - Gloves
 - All of the above must be worn when capturing radiology images.
23. What type of pathogens could become colonized in a dental unit waterline?
- Protozoa
 - Fungi
 - Bacteria
 - All of the above
24. What is the EPA water standard for colony forming units per mL of drinking water?
- 500 CFU
 - 2,000 CFU
 - 5,000 CFU
 - 5,000,000 CFU
25. Studies have shown how many colony-forming units have been found five days after the installation of a new dental unit waterline?
- 5,000 CFU
 - 2,000 CFU
 - 200,000 CFU
 - 1 million CFU
26. When cleaning and disinfecting a dental operatory, what should the provider be wearing as recommended by the CDC?
- Mask, gloves, gown, eyewear
 - Gloves only
 - Mask and gloves only
 - No PPE needs to be worn
27. Which of the following is an example of a clinical contact area?
- Floors
 - Bracket tray
 - Sink
 - Drapes
28. Which of the following chemicals should be used in the dental operatory to clean clinical contact surfaces?
- Low-level disinfectant
 - Intermediate-level disinfectant
 - High-level disinfectant
 - Soap and water
29. What pathogen do intermediate-level disinfectants claim to be able to kill?
- Staphylococcus aureus*
 - Mycobacterium tuberculosis*
 - MRSA
 - Streptococcus salivarius*
30. Which of the following chemicals should be used in the dental office to clean housekeeping surfaces?
- Low-level disinfectant
 - Intermediate-level disinfectant
 - Detergent and water
 - Both A & C

The down and dirty side of dentistry: Infection prevention that saves lives!

NAME: _____ TITLE: _____ SPECIALTY: _____
 ADDRESS: _____ EMAIL: _____ AGD MEMBER ID (IF APPLIES): _____
 CITY: _____ STATE: _____ ZIP: _____ COUNTRY: _____
 TELEPHONE: PRIMARY () _____ OFFICE () _____ LICENSE RENEWAL DATE: _____

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. A score of 70% is required for CE credit. **FOR QUESTIONS, CALL (800) 633-1681. COURSE MAY ALSO BE COMPLETED AT DENTALACADEMYOFCE.COM.**

Educational Objectives

- Understand the importance of hand hygiene and personal protective equipment that is needed to ensure the safety of patients and themselves.
- Control aerosols produced during dental procedures based on the Centers for Disease Control and Prevention recommendations.
- Minimize risk of injury through controlling environmental hazards such as radiation exposure and when disinfecting clinical and housekeeping contact surfaces.
- Understand the importance of dental waterline maintenance.

Course Evaluation

- 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.

- To what extent were the course objectives accomplished overall? 5 4 3 2 1 0
- Please rate your personal mastery of the course objectives. 5 4 3 2 1 0
- How would you rate the objectives and educational methods? 5 4 3 2 1 0
- How do you rate the author's grasp of the topic? 5 4 3 2 1 0
- Please rate the instructor's effectiveness. 5 4 3 2 1 0
- Was the overall administration of the course effective? 5 4 3 2 1 0
- Please rate the usefulness and clinical applicability of this course. 5 4 3 2 1 0
- Please rate the usefulness of the supplemental webliography. 5 4 3 2 1 0
- Do you feel that the references were adequate? Yes No
- Would you participate in a similar program on a different topic? Yes No
- If any of the continuing education questions were unclear or ambiguous, please list them.

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

- How long did it take you to complete this course?

- What additional continuing dental 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 \$59 is enclosed.
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.

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| 1. (A) (B) (C) (D) | 16. (A) (B) (C) (D) |
| 2. (A) (B) (C) (D) | 17. (A) (B) (C) (D) |
| 3. (A) (B) (C) (D) | 18. (A) (B) (C) (D) |
| 4. (A) (B) (C) (D) | 19. (A) (B) (C) (D) |
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| 10. (A) (B) (C) (D) | 25. (A) (B) (C) (D) |
| 11. (A) (B) (C) (D) | 26. (A) (B) (C) (D) |
| 12. (A) (B) (C) (D) | 27. (A) (B) (C) (D) |
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| 14. (A) (B) (C) (D) | 29. (A) (B) (C) (D) |
| 15. (A) (B) (C) (D) | 30. (A) (B) (C) (D) |

AGD Code 150

PLEASE PHOTOCOPY ANSWER SHEET FOR ADDITIONAL PARTICIPANTS.

INSTRUCTIONS
 All questions have only one answer. Grading of this examination is done manually. Participants will receive confirmation of passing by receipt of a verification form. Verification of Participation forms will be mailed within two weeks after taking an examination.

COURSE EVALUATION AND FEEDBACK
 We encourage participant feedback. Complete the survey above and e-mail feedback to Aileen Gunter (agunter@endeavor2b.com) and Laura Winfield (lwinfield@endeavor2b.com).

COURSE CREDITS AND COST
 All participants scoring at least 70% on the examination will receive a verification form for three CE credits. The formal CE program of this sponsor is accepted by the AGD for fellowship and mastership credit. Please contact Endeavor for current term of acceptance. Participants are urged to contact their state dental boards for continuing education requirements. Endeavor is a California CE provider. The California provider number is 4527. The cost for courses ranges from \$20 to \$110.

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/goto/cerp/.

Endeavor 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 11/1/2015 to 10/31/2019. Provider ID # 320452.

RECORD KEEPING
 Endeavor 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.

EDUCATIONAL DISCLAIMER
 Completing a single CE course should not provide enough information to give participants the feeling that they are experts in the field related to the course topic. It is a combination of many educational courses and clinical experience that allows the participant to develop skills and expertise.

CANCELLATION AND REFUND POLICY
 Any participant who is not 100% satisfied with this course can request a full refund by contacting Endeavor in writing.

IMAGE AUTHENTICITY
 The images provided and included in this course have not been altered.

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CUSTOMER SERVICE | CALL (800) 633-1681