SPECIAL ISSUE

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Infection Control: Safeguarding Your Patients' and Practice's Health

Heath care professionals are faced with balancing the need to deliver quality care and effectively manage the clinical and business challenges posed by the COVID-19 pandemic. In this special issue of Dental Practice Success, experts in infection control and business address strategies to safeguard patients, staff and dentists, and outline business essentials to maintain the health of the practice during this difficult time period. Working collaboratively with the Organization for Safety, Asepsis and Prevention (OSAP), DPS has recruited infection control experts, including John A. Molinari, Ph.D. to offer a comprehensive overview of environmental surface disinfection, and Eve Cuny to explore best practices for using personal protective equipment to ensure the safety of patients and dental health care personnel. In addition, Dr. Roger P. Levin outlines seven key performance indicators critical for the COVID-19 recovery.

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Environmental Surface Disinfection Considerations

By John A. Molinari, PhD

It is common for environmental surfaces to become soiled with blood, saliva, exudate, and other biological matter in health care settings during patient care. It is also well documented that environmental contamination can play an important role in the transmission of health care-associated infections in hospitals and long-term care facilities.[1,2] Causative pathogens include *Staphylococcus aureus*, noroviruses, *Clostridium difficile*, and hepatitis C virus. Other microbial etiologies include a variety of bacterial, viral, and fungal nosocomial pathogens, including isolates that have become increasingly drug resistant.[3,4] Even before the COVID-19 pandemic, investigations determined that most gram-positive bacteria, many gram-negative bacteria, blood-borne viruses (for example, hepatitis B and hepatitis C viruses), and a number of respiratory tract viral pathogens were able to survive on inanimate surfaces for days, weeks, or longer (Table 1[2,5-8,10]). Persistent organisms, such as methicillin-resistant *S. aureus*, also can be frequently passed to inanimate items from contaminated health care professionals' (HCP) hands and gloves. Methicillin-resistant *S. aureus* and other organisms can be difficult to eliminate if recommended cleaning and disinfection procedures are not followed. Findings from a 2020 study showing that viable severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) virus can be detected for hours to a few days on inanimate surfaces have further increased cross infection concerns for medical and dental HCP and the public.[8]

Ongoing research and clinical reports studying surface cross-contamination and cross-infection risks have provided HCP with science-based principles, protocols, and practices. Compliance with basic tenets and their applications is fundamental in health care facilities, and environmental surface asepsis between patients remains an important component of an effective infection prevention program. The following brief discussion will focus on dental settings by outlining current guidance from appropriate governmental and health professional agencies. Key principles and elements of a successful surface asepsis program in dental practices will be discussed.

TABLE 1: Microbial Persistence on Dry Inanimate Surfaces

Microorganism	Duration of Persistence
Severe Acute Respiratory Syndrome-Coronavirus-2	**2-3 days** (plastics/stainless steel surfaces)\ **24 hours** (cardboard)
Staphylococcus aureus (including methicillin-resistant *Staphylococcus aureus*)	7 days-7 months
Enterococcus species (including vancomycin-resistant enterococcus)	5 days-4 months
Escherichia coli	1.5 hours-16 months
Influenza viruses	1-2 days
Rhinoviruses	2 hours-24 hours
Herpes simplex viruses	4 hours-8 weeks
Hepatitis B virus	> 1 week (in blood)
Hepatitis C virus	16 hours-6 weeks (in blood)
Hepatitis A virus	2 hours-2 months

Source: Adapted from multiple sources including: Weber and colleagues,[2] Rutala and colleagues,[10] Hota,[5] Kramer and colleagues,[6] Paintstil and colleagues,[7] and van Dormalen and colleagues.[8]

Selection of a Surface Disinfectant

There were far fewer products available for dental practices in the 1980s and 1990s in comparison with the wide array of current surface disinfectant sprays and wipes that offer a range of antimicrobial and use characteristics. Unfortunately, selection of a product can be difficult owing to exaggerated claims, misleading reports in the literature, or lack of awareness

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TABLE 2: Properties of an Ideal Disinfectant

Broad spectrum	Should always have the widest possible antimicrobial spectrum
Fast acting	Should always have a rapidly lethal action on all vegetative forms of bacteria and fungi and viruses
Remains wet	Should keep surfaces wet long enough to meet listed kill/contact times with single application or meet wet times recommended by evidence-based guidelines
Not affected by physical factors	Active in the presence of organic matter such as blood, sputum, and feces
Nontoxic	
Nonallergenic	
Cleaner	Should have good cleaning properties
Surface compatibility	Should not compromise integrity of dental equipment and metallic surfaces Should not cause the disintegration of cloth, rubber, plastics, or other materials
Persistence	Should have sustained antimicrobial activity or residual antimicrobial effect on treated surfaces
Easy to use	
Odorless	Should have an odor that is acceptable to users and patients
Economical	Cost should not be prohibitively high

Source: Molinari and colleagues[9] and Rutala and colleagues[10]

about the appropriate guidelines to follow. These issues can be prevented by comparing the efficacy of available agents with their published properties for an ***ideal*** surface disinfectant (Table 2[9,10]). Although the perfect surface disinfectant has not been found, dental practices can make more informed choices by using the following criteria when evaluating disinfectant candidates.

Classification of Chemical Disinfectants and Sterilants

Chemical disinfectants in the United States are regulated and registered with the Environmental Protection Agency (EPA), while chemical sterilants and high-level disinfectants are regulated by the US Food and Drug Administration. Major distinctions between the 3 chemical categories as classified by the Centers for Disease Control and Prevention are shown in Figure 1.[11]

1. **Low-level: EPA-registered as a hospital disinfectant.** These are chemicals with the narrowest antimicrobial range and are termed hospital-level disinfectants. To receive EPA approval, they are required to show effectiveness against 3 species of test pathogens: *S. aureus*, *Salmonella choleraesuis*, and *Pseudomonas aeruginosa*. The Occupational Safety and Health Administration requires low-level disinfectants to also have a label claim for effectiveness against hepatitis B virus and HIV if used for disinfecting clinical contact surfaces. Low-level disinfection is a process that will inactivate most vegetative bacteria, some fungi, and some viruses, but it cannot be relied on to inactivate resistant microorganisms such as mycobacteria.

2. **Intermediate-level:** EPA-registered as a hospital disinfectant with a tuberculocidal claim. Although they do not inactivate

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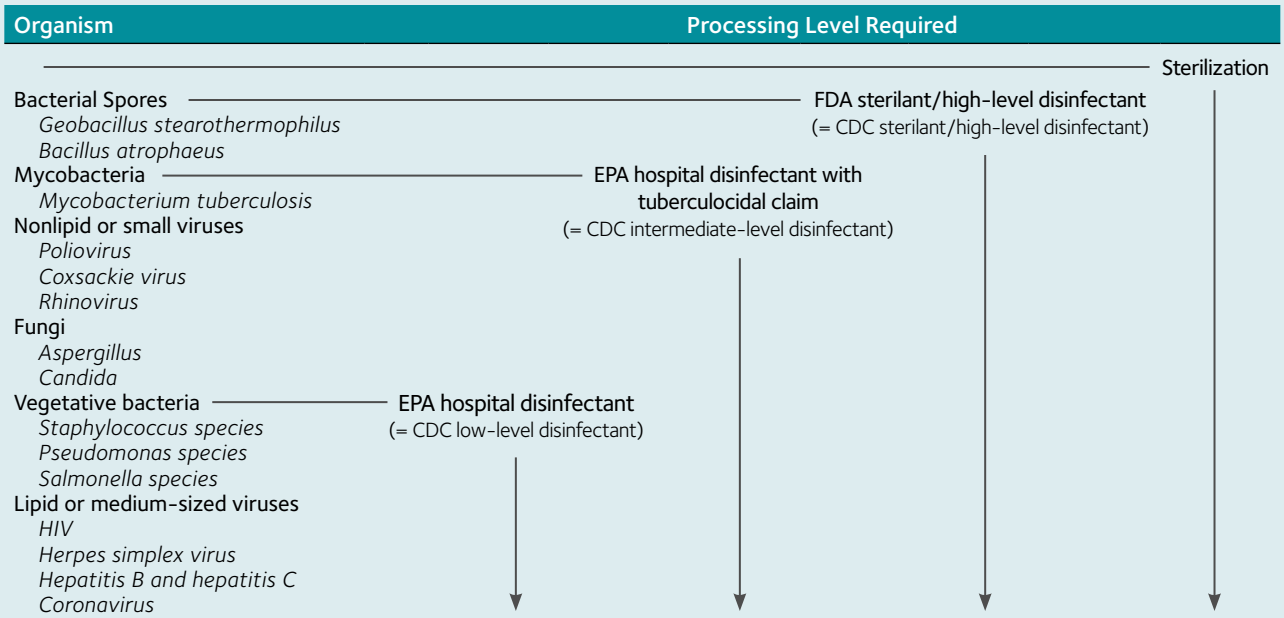
FIGURE 1 : Decreasing Order of Resistance of Microorganisms to Germicidal Chemicals



Sources: CDC: Centers for Disease Control and Prevention. EPA: Environmental Protection Agency. FDA: US Food and Drug Administration.

bacterial endospores, intermediate-level disinfectants kill many other microbial forms, including tubercle bacteria (that is, *Mycobacterium tuberculosis*). *M. tuberculosis* presents a severe challenge to disinfectants and is routinely used as a test organism owing to its resistance. Documented tuberculocidal activity assures the user that the product is an intermediate- or high-level disinfectant and that it will kill microorganisms known to be potential pathogens in dentistry.

3. **High-level:** US Food and Drug Administration–approved chemical agents capable of sterilizing items, but only after prolonged immersion intervals (that is, glutaraldehydes, hydrogen peroxide, and peracetic acid). Treatment of contaminated environmental surfaces does not require use of chemical sterilants or high-level disinfection and will not be discussed further.

When reviewing the examples of microbes in Figure 1, it becomes apparent that coronaviruses are a group of viruses that are susceptible to disinfection. One of the features used to characterize viruses is the presence or absence of a lipid envelope. Enveloped (hydrophobic) and nonenveloped (hydrophilic) viruses have different susceptibilities to chemical disinfectants. Hydrophobic viruses are much more susceptible to these chemical preparations than hydrophilic ones. This was shown to be due to the presence of essential lipids in the viral envelope. Coronaviruses including SARS-CoV-2 are enveloped viruses. Concerns about the effectiveness of different disinfectants against SARS-CoV-2 led the EPA to develop a list (List N) of disinfectants for use against SARS-CoV-2.[12] All products on the list must meet EPA criteria for use against SARS-CoV-2, and the list is routinely updated. Most dental facilities routinely use intermediate-level surface disinfectants; they require higher EPA kill standards than the low-level agents. Thus, there are many available products that are effective against SARS-CoV-2. Check EPA List N to confirm that your practice's disinfectants are included.

Environmental Surface Asepsis Checklist for Dental Practice

Figure 2 provides a suggested protocol for environmental surface asepsis in dental facilities. It was developed as a component of a comprehensive infection control resource by the Organization for Safety, Asepsis, and Prevention in conjunction with DentaQuest.[13] It is advisable to consult the complete document as infection control practices and protocols will be updated during and after COVID-19. Dental professionals may also want to consult a checklist published in July 2020, which provides additional useful supplemental information.[14] ✦

FIGURE 2: Representative Checklist for Environmental Surfaces

Environmental Surfaces	YES	NO
Clean and disinfect the room and equipment according to the Guidelines for Infection Control in Dental Health-care Settings: 2003.[11]	☐	☐
• Appropriate personal protective equipment is used for all cleaning and disinfecting procedures based on manufacturer's instructions for use (IFU).		
Before clinical care, plastic barriers:		
• are applied to difficult to clean surfaces (for example, air-water syringes, suction valve technology, handpiece docking area, and computer keyboards);	☐	☐
• should be fluid resistant, fit properly, and be easy to remove. If the surface under the barrier becomes contaminated, proper cleaning and disinfection must be performed.	☐	☐
Operatories are cleaned and disinfected with a product from the Environmental Protection Agency List N: Disinfectants for Use Against SARS-CoV-2 (COVID-19).[12]	☐	☐
• Follow the manufacturer's instructions for use on listed contact times to ensure adequate disinfection of surfaces.	☐	☐
Schedule patient appointments to allow adequate time for appropriate cleaning and disinfection.	☐	☐

Sources: Kohn and colleagues,[11] United States Environmental Protection Agency.[12]

Dr. Molinari earned a PhD in microbiology from the University of Pittsburgh and subsequently worked as a faculty member in the School of Dental Medicine. He is a Professor Emeritus at the University of Detroit Mercy, where he served for 32 years in the School of Dentistry as Professor and the chairman of the Department of Biomedical Sciences and the director of Infection Control. Later, he was the infection control director for Dental Advisor where he was involved in research on newly developed infection prevention technologies and products. He has published more than 500 scientific articles, text chapters, and abstracts in the areas of microbiology and immunology, and he lectures nationally and internationally on topics dealing with infectious diseases and infection control. He also has been a consultant for the Centers for Disease Control and Prevention, the American Dental Association, and regional hospitals.

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Take a Closer Look at PPE to Ensure the Safety of Patients and Dental Health Care Personnel

By Eve Cuny, MS

By early March 2020, it had become clear that the COVID-19 pandemic was taking a strong hold around the world, especially in the United States. As a result, the American Dental Association (ADA), the Centers for Disease Control and Prevention (CDC), and numerous state and local health authorities recommended or required that all dental procedures be suspended except for care involving emergency and urgent needs. Now, months into the pandemic and as dental offices have resumed routine dental procedures, it is worthwhile to review the changes in personal protective equipment (PPE) to help ensure the safety of patients and dental health care personnel (DHCP).

A 2020 poll of more than 19,000 dentists conducted by the ADA Health Policy Institute showed that by March 23, 76% of US dental offices had closed to all but emergency care, 19% were not seeing any patients, and 5% were open but no longer seeing the same volume of patients.[1] By the beginning of July, nearly 70% of dentists polled by the Health Policy Institute indicated they were back working about the same number of hours as before the pandemic.[2] A critical aspect of resuming routine dental care is the need for adequate and appropriate PPE.

During the time that most dental offices were only providing emergency care, interim recommendations for infection prevention and control precautions provided guidance on how to safely treat patients with urgent needs. As time passed, additional recommendations provided information needed to resume routine care of patients.[3-5] An important and prominent element of returning to patient care was adjusting and expanding the use of PPE. The use of standard precautions in the care of dental patients had long been the recommended approach.[6] Standard precautions alone, however, cannot prevent all disease transmission because they are focused on avoiding contact with patients' body fluids through contact with mucous membranes and nonintact skin and via percutaneous injury such as a needlestick. For some infectious diseases, a second tier of precautions called "transmission-based precautions" is needed. Transmission-based precautions are necessary when caring for patients with infectious diseases that transmit via contact, droplet, or airborne transmission.[7] COVID-19 is believed to be most likely transmitted by contact with infectious droplets, but it may also transmit via the airborne route.[8]

Dental Aerosols

Dental procedures often involve aerosol-generating procedures. The greatest number of aerosols are generated during restorative and preventive procedures involving the use of handpieces and ultrasonic scalers.[9] For that reason, it is currently recommended that the use of ultrasonic scalers be suspended.[4] Components of dental aerosols include water, blood, microorganisms, mucosal cells, restorative materials, tooth particles, and large quantities of saliva.[10] Owing to the nature of dental procedures, DHCP must be near the source of these aerosols while providing patient care. PPE is an important element of both standard and transmission-based precautions. The current focus on PPE is an opportunity to ensure DHCP are using and managing PPE appropriately. Hand hygiene is closely connected to PPE and should be performed before donning and after removing PPE.

Gowns and Protective Clothing

Surgical gowns, laboratory coats, and other protective attire have long been recommended for the protection of DHCP during procedures that generate spray or spatter from the patient's

*See **CLOSER LOOK**, Page 8*

mouth.[6,11,12] During the COVID-19 pandemic, government agencies and professional organizations have reinforced and clarified the need to wear protective attire that will help prevent personal clothing and skin (for example, forearms) from becoming soiled with blood, saliva, or other potentially infectious materials.[3-5] Gowns should be changed if they become soiled. Disposable gowns should be discarded after use, and reusable gowns, such as cloth gowns, should be collected in a designated container for laundering.[4]

Gloves

For nonsurgical dental procedures, DHCP may use nonsterile medical examination gloves. Gloves should be placed last in the sequence of donning PPE and should be changed if they become torn or heavily contaminated.[4] For surgical procedures, DHCP should wear sterile surgeon's gloves. For oral surgical procedures, perform surgical hand antisepsis before donning gloves. Use either an antimicrobial soap and water, or soap and water followed by drying hands and then applying an alcohol-based surgical handscrub.[6]

Eye Protection

DHCP should wear eye protection that will prevent debris from dental procedures contacting the mucous membranes of their eyes. Goggles that do not have gaps and provide side protection or a full face shield that also protects the side of the wearer's face are recommended.[4] The CDC interim guidance suggests that DHCP working in locations where there is moderate to substantial transmission of COVID-19 also wear eye protection as source protection.[4] This means that eye protection would be worn to protect against respiratory droplets and aerosols even when performing procedures that do not generate spray or spatter, such as examinations.[4]

Many DHCP wear magnification loupes during dental procedures, which can make it difficult to wear goggles or a close-fitting face shield. When wearing a face shield over loupes, ensure that the face shield does not have gaps (for example, for headlamps), and that it provides adequate side protection. Reusable eye protection should be cleaned or disinfected between patients according the manufacturer's instructions for use.[4]

Masks and Respiratory Protection

The CDC interim guidance suggests that dental practices in locations where there is no to minimal community transmission may continue to use surgical masks for protection when performing procedures that may generate splashes or spatter of blood or other body fluids.[4] Surgical masks are cleared by the US Food and Drug Administration (FDA) and meet standards set by ASTM International, an international standards organization that develops and publishes voluntary consensus technical standards for a wide range of materials, products, systems, and services. Surgical masks are assigned 3 levels, depending on their ability to filter fine particles, breathability, fluid resistance, and flame spread. All 3 levels are appropriate for health care uses but differ primarily in their ability to resist fluid (Figure 1).

FIGURE 1:
ASTM International Levels of Surgical Masks

Characteristic	Level 1	Level 2	Level 3
Bacterial filtration efficacy, %	≥ 95	≥ 98	≥ 98
Submicron particulates filtration efficient at 0.1 micron, %	≥ 95	≥ 98	≥ 98
Differential pressure (breathability), millimeters of water per square centimeter	< 4.0	< 5	< 5.0
Resistance to penetration by synthetic blood, minimum pressure, in millimeters of mercury for pass results	80	120	160
Flame spread	Class 1	Class 1	Class 1

Adapted from: ASTM F2299/F2299M-03(2017) Standard Test Method for Determining the Initial Efficiency of Materials Used in Medical Face Masks to Penetration by Particulates Using Latex Spheres; ASTM F2101-19 Standard Test Method for Evaluating the Bacterial Filtration Efficiency (BFE) of Medical Face Mask Materials, Using a Biological Aerosol of Staphylococcus aureus; ASTM F2100-19 Standard Specification for Performance of Materials Used in Medical Face Masks; ASTM F1862/F1862M-17 Standard Test Method for Resistance of Medical Face Masks to Penetration by Synthetic Blood (Horizontal Projection of Fixed Volume at a Known Velocity)

In locations where there is moderate to substantial community transmission, the CDC recommends the use of respirators to provide at least the level of N95 filtering facepiece respirators during aerosol-generating procedures.[4] Before using respirators, employers must establish a written respiratory protection program, offer medical evaluation, fit testing, and provide training for all employees using the respirators in compliance with the Occupational Safety and Health Administration respiratory protection standard.[13] The standard also requires annual fit testing for employees using respirators. The Occupational Safety and Health Administration has advised compliance and enforcement officers that they can temporarily exercise discretion in enforcement of the annual fit test requirement due to shortages of N95 and other respirators.[14] However, the initial fit testing is still required. Surgical masks protect from splashes and spatter and provide some source control but are not

*See **CLOSER LOOK**, Page 10*

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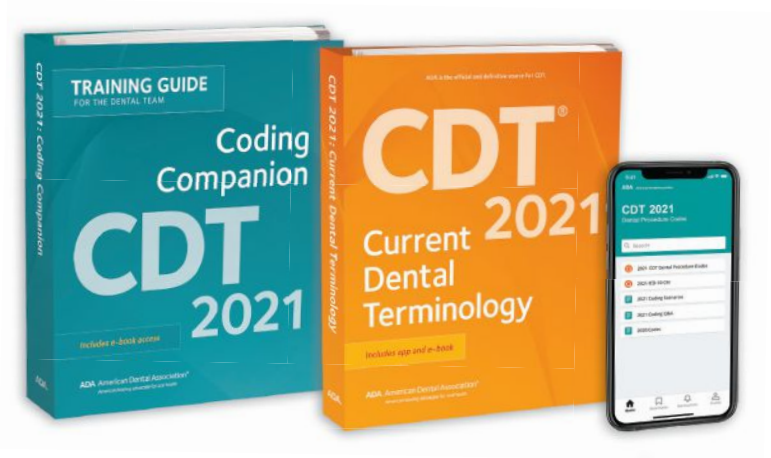

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FIGURE 2: Respirator On / Respirator Off

When you put on a disposable respirator:

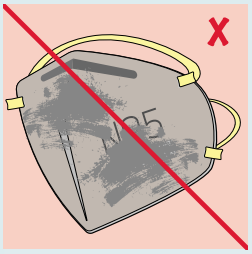
Position your respirator correctly and check the seal to protect yourself from COVID-19.

Cup the respirator in your hand. Hold the respirator under your chin with the nose piece up. The top strap (on single or double strap respirators) goes over and rests at the top back of your head. The bottom strap is positioned around the neck and below the ears.

Place your fingertips from both hands at the top of the metal nose clip (if present). Slide fingertips down both sides of the metal strip to mold the nose area to the shape of your nose.

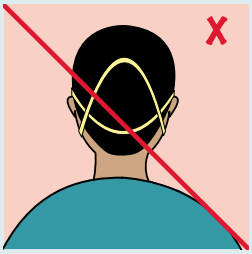
Place both hands over the respirator, take a quick breath in to check the seal. Breathe out. If you feel a leak when breathing in or breathing out, there is not a proper seal.

Select other PPE items that do not interfere with the fit or performance of your respirator.

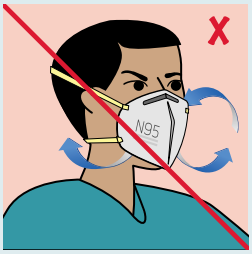


Do not use a respirator that appears damaged or deformed, no longer forms an effective seal to the face, becomes wet or visibly dirty, or if breathing becomes difficult.

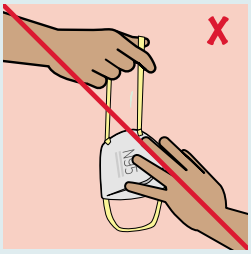
Do not allow facial hair, jewelry, glasses, clothing, or anything else to prevent proper placement or to come between your face and the respirator.



Do not crisscross the straps.



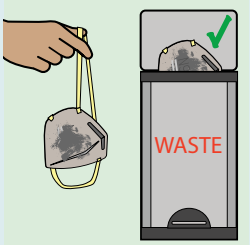
Do not wear a respirator that does not have a proper seal. If air leaks in or out, ask for help or try a different size or model.



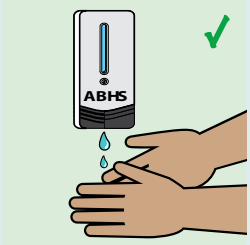
Do not touch the front of the respirator during or after use! It may be contaminated.

When you take off a disposable respirator:

Remove by pulling the bottom strap over back of head, followed by the top strap, without touching the respirator.



Discard in a waste container.



Clean your hands with alcohol-based hand sanitizer or soap and water.

Adapted from Centers for Disease Control and Prevention: https://www.cdc.gov/coronavirus/2019-ncov/downloads/hcp/fs-respirator-on-off.pdf. Additional information is available about how to safely put on and remove personal protective equipment, including respirators: https://www.cdc.gov/coronavirus/2019-ncov/hcp/using-ppe.html

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considered respiratory protection. Respirators, such as the N95, must be worn correctly, inspected before each use, and have a user seal check before each use. Figure 2 depicts the proper way to don, seal check, and remove an N95 respirator.

Respirators are tested by the National Institute for Occupational Safety and Health, and respirators intended for medical use are cleared by the FDA. During the COVID-19 pandemic, the FDA allowed emergency use authorization for some respirators that have not been tested by the National Institute for Occupational Safety and Health. The FDA maintains a list of respirators authorized under this emergency use authorization on its website.

PPE Optimization

In some locations, cases of COVID-19 surged rapidly and left health care workers with limited supplies of necessary materials, including PPE. Because of high demand, shortages of PPE were soon widespread. As a result, CDC issued recommendations for optimization of PPE during shortages caused by the COVID-19 pandemic.[15] Some of the strategies include extending the use or reusing PPE that is normally considered single use or disposable.

PPE optimization strategies are only intended for times when there are shortages of PPE and should not be adopted as routine practice.[4] These strategies take a tiered approach, identifying 3 separate capacity scenarios: conventional, contingency, and crisis. Under conventional capacity adequate supplies are available, and there is no need to alter the use of PPE. For contingency and crisis capacity, some compromises are made due to shortages only after other control measures have been instituted (Figure 3).

*See **CLOSER LOOK**, Page 13*

FIGURE 3: PPE Optimization Strategies for Conventional, Contingency, and Crisis Capacity

Conventional Capacity strategies that should already be in place as part of general infection prevention and control plans in health care settings	**Contingency Capacity** stategies that can be used during periods of anticipated PPE shortages	**Crisis Capacity*** strategies that can be used when supplies cannot meet the facility's current or anticipated PPE utilization rate *Not commensurate with U.S. standards of care
• Limit the number of patients. • Use telemedicine when possible. • Exclude visitors. • Use alternatives to N95 respirators, such as elastomeric and powered air purifying respirators.	• Selectively cancel elective and nonurgent procedures. • Temporarily suspend annual fit testing (must still perform initial fit testing for respirators). • Use N95 respirators beyond the manufacturer-designated shelf life for training and fit testing. • Extend use of N95 respirators by wearing the same N95 for repeated close contact with several different patients.	**Respirators and face masks** • Use respirators and face masks beyond the manufacturer designated shelf life for health care delivery. • Use respirators approved under standards used in other countries. • Implement limited reuse of N95 respirators and face masks. • Prioritize the use of N95 respirators and face masks by activity. *When no face masks are available:* • Use a face shield that covers the entire front (that extends to the chin or below) and sides of the face with no face mask. **Gowns** • Reuse and extend the use of isolation gowns. • Reuse cloth isolation gowns.

Adapted from Centers for Disease Control and Prevention[16]

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***CLOSER LOOK**, Continued from Page 11*

Training in Donning and Doffing PPE

Having the correct PPE is critically important, but the proper use of this equipment is arguably just as important. The manner and sequence in which DHCP don and remove PPE should focus on proper fit, placement, and removal of PPE to minimize the risk of contaminating the wearer's face, skin, and clothing. DHCP should also ensure PPE, such as gloves that will contact the patient, remain uncontaminated from sources such as equipment and environmental surfaces. Several suggested sequences for donning and removing PPE exist and should be adapted to the needs and environment of the care setting. One such suggested sequence is depicted in Figure 4.

Ideally, training will include demonstration and practice of important aspects of PPE, including when to use PPE; what PPE is necessary; how to properly don, use, and doff PPE in a manner to prevent self-contamination; how to properly dispose of or disinfect and maintain PPE; and the limitations of PPE.[4]

*See **CLOSER LOOK**, Page 14*

FIGURE 4: Donning and Doffing PPE

Sequence for Donning PPE

1. Perform hand hygiene.
2. Put on a clean gown or protective clothing that covers personal clothing and skin (for example, forearms) likely to be soiled with blood, saliva, or other potentially infectious materials.
   a. Gowns and protective clothing should be changed if they become soiled.
3. Put on a surgical mask or respirator.
4. Mask ties should be secured on the crown of the head (top tie) and the base of the neck (bottom tie). If mask has loops, hook them appropriately around your ears.
5. Respirator straps should be placed on the crown of the head (top strap) and the base of the neck (bottom strap).
   a. Perform a user seal check each time you put on the respirator.
6. Put on eye protection.
   a. Personal eyeglasses and contact lenses are NOT considered adequate eye protection.
7. Perform hand hygiene.
8. Put on clean nonsterile gloves.
   a. Gloves should be changed if they become torn or heavily contaminated.
9. Enter the patient room or treatment area.

Sequence for Doffing (Removing) PPE

1. Remove gloves.
2. Remove gown or protective clothing and discard the gown in a dedicated container for waste or linen.
   a. Discard disposable gowns after each use.
   b. Launder cloth gowns or protective clothing after each use.
3. Exit the patient room or care area.
4. Perform hand hygiene.
5. Remove eye protection.
   a. Carefully remove eye protection by grabbing the strap and pulling upward and away from head. Do not touch the front of the eye protection.
6. Clean and disinfect reusable eye protection according to manufacturer's reprocessing instructions before reuse.
7. Discard disposable eye protection after use.
8. Remove and discard surgical mask or respirator.
9. Perform hand hygiene.

Adapted from Centers for Disease Control and Prevention.[4]

***CLOSER LOOK**, Continued from Page 13*

Checklists are available from the ADA and the Organization for Safety, Asepsis and Prevention (OSAP) that will assist in the training of DHCP in using PPE during the COVID-19 pandemic. Additional resources are available in the ADA's Return to Work Interim Guidance Toolkit,[5] and the OSAP's OSAP/DQA Best Practices for Infection Control in Dental Clinics during COVID-19 Pandemic.[3] ✦

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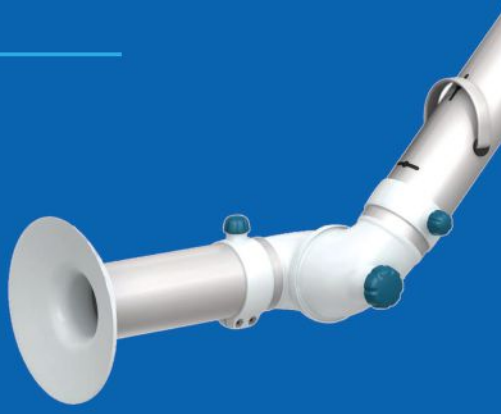

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KEY IDEAS | Practice Recovery, Finance

7 Key Performance Indicators Critical for the COVID-19 Recovery

By Roger P. Levin, DDS

To keep on track for practice success, Levin Group has always encouraged dental practices to establish a key set of measurements or key performance indicators (KPIs) to help monitor their performance. However, understanding and applying these KPIs will be different than in the pre-COVID-19 era. Almost every practice, like most businesses, will be facing a recovery or business turnaround.

consistently to understand the past, current, and projected future performance of the company. In fact, the concept of using key performance indicators (KPIs) is over 100 years old. Unfortunately, dental practices have not always utilized KPIs despite having easy access to them through software generated reports. And some of the practices that do use KPIs only measure a few of them such as production and collections or, even worse, they measure them but do not understand or act on them.

The Recovery Timeline

Levin Group has developed the 24-month COVID-19 Recovery Timeline, which includes the following three phases:

Phase One: Months 1 – 5: **Pent-up demand**
Phase Two: Months 6 – 12: **Production decline**
Phase Three: Months 13 – 24: **Recovery**

Most dental practices experienced a high level of pent-up demand leading to extreme busyness in Phase One. As Phase One begins to decline, Phase Two will be characterized by many practices noting a decline in production. At around month 12 into the recovery we will enter Phase Three which is the actual recovery. This will be characterized by a gradual rebuilding of practice production. After 24 months many practices will be functioning at 80% (or more) of 2019's monthly production average. Keep in mind that any or all of these projections may need to be recast depending on external factors such as a vaccine timing or definitive treatment for the virus. Data from ADA's Health Policy Institute also show that patient volume was at 81% of pre-COVID-19 levels as of Sept. 21.

Measure Your Way to Success

All business and management experts would advise any company to have a clear set of metrics that are measured

During the COVID-19 crisis it's more critical than ever to have a set of KPIs that are consistently measured and understood. However, in a recovery you'll measure fewer things than you would under normal circumstances. Practices must be highly focused on the most critical KPIs, measuring them as frequently as possible so that modifications can be made when necessary.

The Seven Most Important KPIs

The KPIs that practices must put the most focus on include:

1 **Production.** Production is the single most important factor in the recovery. This is based on a simple formula that production creates revenue, revenue creates cash, and cash creates income. If a practice has the right level of production it will not only survive COVID-19 but will move back into a strong and successful position. To maximize production in the face of a lower patient volume, new management methods must be put in place.

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For example, production can be increased by scheduling the largest cases as soon as possible and extending patient appointments to complete as much dentistry as possible. Another method that practices may want to consider is expanding or shifting hours to create a higher level of convenience for patients.

Practices should establish a general production goal and measure performance each day against that goal. If production is steady or increasing, then the practice is in a positive position for recovery. If it is declining, then new approaches need to be established.

2 **Collection.** Although production is the single most important factor in practice recovery, production alone is not sufficient. Practices should target collecting 98% of all money that is owed to the practice. Many practices collect far less than 98%, and we're expecting that collections will become increasingly difficult if economic financial challenges expand. Like in retail businesses, practices need a very streamlined and efficient collection system, and the goal should be to collect payments due at the time of the service. However, dental practices differ from retail in that insurance reimbursements, and payments from patient financing and payment plans can take time to recoup. This means that practices need a well-scripted approach to collecting at the time of service, and a plan to track payments daily and collect on overdue payments. Practices that allow accounts receivable to expand and increase will have a slower practice recovery.

3 **Expenses.** Expenses, or what most practices refer to as overhead, are another critical factor in the recovery. It might make sense to believe that reducing all possible expenses to a minimal level is in the best interest of the practice, but this is not necessarily the case. Although expenses should be carefully monitored and streamlined, practices will need to invest in opportunities that can contribute to a strong recovery. For example, if a practice decides to decrease its number of dental assistants, it may find it also ends up decreasing the capability for creating production by more than the compensation of the dental assistant. Most dental assistants have the capability of allowing for a minimum production increase of 3 to 5 times their salary, so a decision of this nature must be carefully tied to production.

Another lens to view overhead through is the national statistics for general practices and each specialty. For example, if based on national averages, a practice should be at 60% but is running at 70% or 50%, the practice should analyze the reasons for this higher or lower level of overhead and its impact on recovery.

It's also important to review expense reports in detail. Regardless of the overhead percentage there are areas of the practice that may be higher or lower in performance. For example, if supply costs are 3% higher than recommended overhead targets, the practice can then make decisions about how to reduce those costs going forward. Keep in mind that every 1% that overhead is reduced is $1,000 of profit for every $100,000 of production.

4 **Profit.** Ultimately, profit is the measurement of how well the practice is recovering. As stated earlier, production is the most critical KPI because the right level of production with a reasonably controlled overhead will lead to the right level of profit. Pretend for a minute that the dental practice has stockholders. The stockholders would measure the level of recovery based on the level of profit. If profit is increasing then the practice is recovering and moving in the right direction. If profit is flat or decreasing, the practice is moving in the wrong direction.

5 **Number of active patients.** The number of active patients should now be defined as the number of patients who have appointments. Pre-COVID-19, active patients were defined as patients who had been seen in the practice within the last 18 months. This measurement is no longer valid or beneficial as there will be patients leaving the practice today, a month from now, or 18

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months from now that don't alert the practice to their decision. Almost every dental practice will have patients that don't come back out of fear for COVID-19 or financial concern. In recovery it's important to look at real-time metrics. By measuring the number of active patients based on how many patients are currently scheduled, practices will get a much more realistic view of their patient base. They should then spend time every day contacting patients without appointments, using effective scripting to encourage them to schedule. If the practice has a strong patient base and sees a decline in average production per patient during the COVID-19 recovery, it will still most likely recover well.

6 **Number of overdue patients.** The number of overdue patients is the inverse of the number of scheduled patients but is an equally critical number. On one hand, a high number of overdue patients represents significant potential for the practice if most of these patients get scheduled. On the other hand, every overdue patient represents lost production and a potential lost patient. Practices must do everything possible to reach out to overdue patients, ease their safety and financial concerns, and create confidence for them to make and keep appointments.

7 **Hygiene production.** Dental hygiene is often an under-performing area in the practice. Hygienists must always be focused on excellent care, comprehensive diagnosis, providing routine services such as radiographs and fluoride, and offering the opportunity for elective services. When they do, it creates a very positive result for the practice without increasing the time allotted for the hygiene appointment. Start with a baseline of understanding the current average production per hygienist per patient and per day. Then track progress as the recommendations above are implemented. There should be a steady increase in overall hygiene production until it reaches a new stable baseline and a higher level of practice production.

Summary

These seven KPIs are critical measurements. For example, a practice that is increasing in production and collection while stable or decreasing in overhead is most likely moving in the right direction. Conversely, a practice increasing in overdue patients will gradually decline in production and collection, and potentially increase in overhead. The key is to monitor these measurements daily, weekly, and monthly so that important improvements can be made. ✦

Roger P. Levin, DDS is the CEO and Founder of Levin Group, a leading practice management consulting firm that has worked with over 30,000 practices to increase production. A recognized expert on dental practice management and marketing, he has written 67 books and over 4,000 articles and regularly presents seminars in the U.S. and around the world. To contact Dr. Levin or to join the 40,000 dental professionals who receive his Practice Production Tip of the Day, visit www.levingroup.com *or email* rlevin@levingroup.com.

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Rotary and Oscillating Handpieces Spread Biological Tracer Throughout the Entire Dental Operatory

Source: Journal of the American Dental Association
Title: Topographic Aspects of Airborne Contamination Caused by the Use of Dental Handpieces in the Operative Environment
J Am Dent Assoc 2020 Sep 01;151(9)660-667, AC Ionescu, MG Cagetti, JL Ferracane, F Garcia-Godoy, E Brambilla

Take-home message submitted by Laurie C. Carter, DDS, PhD
Aerosol particles can remain suspended for up to 30 minutes after the end of an operative procedure, and the coronavirus causing COVID-19 can survive on surfaces for up to 72 hours. This is the first study to determine the topographical distribution of surface contaminants in the dental operatory, information which is essential in implementing protocols for disinfection procedures in areas with critical levels of pathogens.

The authors conclude that the distance reached by aerosols had heretofore been severely underestimated and that all surfaces of the dental operatory within 360 cm of the patient's oral cavity need meticulous disinfection. Critical attention must be paid to scrupulous use of personal protective equipment by members of the dental team.

Access the full post: http://handpieces.practiceupdate.com/

Indoor Air Quality Influences the Probability of Pathogen Transmission in the Dental Clinic

Source: Journal of Dental Research
Title: Modeling of the Transmission of Coronaviruses, Measles Virus, Influenza Virus, Mycobacterium tuberculosis, and Legionella pneumophila in Dental Clinics
J. Dent. Res. 2020 Sep 01;99(10)1192-1198, C Zemouri, SF Awad, CMC Volgenant, W Crielaard, AMGA Laheij, JJ de Soet

Take-home message submitted by Laurie C. Carter, DDS, PhD
The probability of transmission of airborne infectious diseases to dental healthcare workers (DHWs) was modeled using a modified version of the Wells–Riley equation, incorporating indoor air quality (using CO_2 as a proxy) and respiratory protection rates from masks. The highest transmission probability was found in high-risk scenarios for measles virus (100%), SARS-CoV viruses (99.4%), influenza virus (89.4%), and tuberculosis (84.0%). The probability of transmission of the modeled pathogens in the low-risk scenarios was low, but higher for airborne viral pathogens than bacterial. Transmission of coronaviruses remains low when a DHW is exposed to a patient with low infectivity, but an increase in infectivity or indoor CO_2 increases transmission risk to 52.6% and 99.4%, respectively. The sensitivity analyses estimated that changes in indoor air quality had the strongest influence on probability of pathogen transmission.

Based on the results of this study, the authors conclude that the risk for transmission of tuberculosis in the dental clinic is low, while the risk for measles virus is high. Risk for transmission of

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coronaviruses is comparable to that of influenza. The CO_2 level in the dental clinic has the strongest influence on transmission probability, a fact that stresses the importance of continuous air changes in this setting.

Access the full post: http://indoorair.practiceupdate.com/

Decontamination Methods for Reuse of N95 Respirators

Source: JAMA Otolaryngology – Head & Neck Surgery
Title: Decontamination Methods for Reuse of Filtering Facepiece Respirators
JAMA Otolaryngol Head Neck Surg 2020 Jul 02;[EPub Ahead of Print], BM Su-Velez, T Maxim, JL Long, MA St John, MA Holliday

Take-home message submitted by Laurie C. Carter, DDS, PhD
The authors reviewed the most current literature on decontamination of N95 respirators, which could enable extension of a limited supply while providing for maximum safety of healthcare professionals. UV light (UVGI), steam heating, dry heat, and vaporized hydrogen peroxide (VHP) sterilization all show potential to permit effective and safe reuse of N95 respirators. UVGI and VHP appear to be the most promising candidates. Proper hand hygiene, handling of used PPE, and donning and doffing techniques are paramount when handling contaminated respirators to minimize risk of infection. In addition, a surgical mask or face shield should be worn over the N95 respirator for additional protection and to reduce soiling. Another technique to allow reuse of N95 respirators is decontamination by time for at least 72 hours, while still using careful PPE donning and doffing techniques, as most viral particles will no longer be viable.

Filtering facepiece respirators (N95) are especially critical for healthcare professionals performing high-risk, aerosol-generating procedures in the upper aerodigestive tract, where the SARS-CoV-2 viral load is high. A decontamination procedure is useful only if it preserves the integrity and electrostatic charge of the filter material and mask fit. The authors conclude that, during times of scarce PPE resources, decontamination by time and rotating N95 masks or resterilization by methods such as UVGI or VHP can mitigate the limited supply of respirators and the risk of infection from the virus on used PPE.

Access full post: http://decontamination.practiceupdate.com/

Relevance of SARS-CoV-2 in the Oral Cavity

Source: Clinical Oral Investigations
Title: Is the Oral Cavity Relevant in SARS-CoV-2 Pandemic?
Clin Oral Investig 2020 Aug 01;24(8)2925-2930, D Herrera, J Serrano, S Roldán, M Sanz

Take-home message submitted by Tapan N. Koticha, BDS, MDS
This short communication evaluated the importance of the oral cavity in disease transmission and the possible impact of using oral antiseptics to reduce the transmission and pathogenicity of SARS-CoV-2. A literature review approach was used to address the relevance of the oral cavity in the transmission and pathogenicity of SARS-CoV-2, and whether oral antiseptics have an impact. The increased concentration of ACE2 receptors in the oral epithelium and salivary glands explains the high viral load in the oral cavity and saliva of infected individuals.

Considering the high risk of aerosol production in clinical dentistry, the beneficial effects of reducing viral load in the oral cavity cannot be ignored. Antiseptic rinses, especially those containing povidone iodine or cetylpyridinium chloride, used as either a pre-procedural rinse or a short-term daily rinse, could potentially reduce viral pathogenicity and transmission risk, especially during dental procedures. However, the evidence behind these recommendations is indirect, and further COVID-19–specific clinical studies are needed to confirm these recommendations.

Access the full post: http://oralcavity.practiceupdate.com/

Hand Hygiene During COVID-19

Source: Journal of the American Academy of Dermatology
J Am Acad Dermatol 2020 Jul 21;[EPub Ahead of Print], CW Rundle, CL Presley, M Militello, C Barber, DL Powell, SE Jacob, AR Atwater, KL Watsky, J Yu, CA Dunnick

Take-home message submitted by Margaret Hammond, MD
Hand hygiene products fall into the categories of soap (a fatty acid salt with cleansing properties and a pH between 9 and 10), synthetic detergents, antiseptic cleansers, and alcohol-based hand sanitizers. Detergents are the harshest on skin barrier function, eroding the lipid barrier of the stratum corneum and leading to increased transepidermal water loss and penetration of irritants and allergens. Alcohol-based hand sanitizers have fewer lipid-dissolving effects. The temperature of water used for cleansing does not affect microbe removal, so use cold or lukewarm water to prevent skin irritation. Use moisturizer devoid of common allergens and fragrance after washing. Avoid donning gloves when hands are still wet, as this potentially traps irritating ingredients on the skin.

Hand hygiene is essential for reducing SARS-CoV-2 transmission, but its increase may also lead to elevated incidence of irritant and allergic contact dermatitis. Alcohol-based hand sanitizers with moisturizers have the least sensitizing and irritancy potential compared with soaps and synthetic detergents.

Expert commentary by Howard I. Maibach, MD
Dr. Rundle and colleagues have provided a succinct, precise, and eminently clear summary/insight in a timely manner that addresses

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an important matter on what we know about hand hygiene, as related to COVID-19, but probably also to the rest of all of our professional careers. The interventions are clearly stated, as are the potential complications and best practices. We suspect that this will be duplicated and posted in many medical facilities.

Access the full post: http://handhygiene.practiceupdate.com/

Protective Measures Reduce the Risk of Saliva-Related COVID-19 Transmission in the Dental Clinic

Source: Molecular Oral Microbiology
Title: Saliva Is a Non-Negligible Factor in the Spread of COVID-19
Mol Oral Microbiol 2020 Aug 01;35(4)141-145, Y Li, B Ren, X Peng, T Hu, J Li, T Gong, B Tang, X Xu, X Zhou

Take-home message submitted by Laurie C. Carter, DDS, PhD
SARS-CoV-2 can be detected in 91.7% of saliva samples, indicating the importance of this fluid in the transmission of infection. Dental procedures generate saliva-contaminated spatters, droplets, and aerosols and methods to ameliorate transmission of virus in the dental clinic are crucial.

Patient screening, through recognition of symptoms or use of a saliva-based rapid screening test is a critical first step. In addition to standard PPE, during the COVID-19 pandemic, practitioners should also use protective outerwear, a surgical mask/N95 respirator, and shoe covers. Preprocedural mouth rinses can reduce salivary viral load. Extraoral, rather than intraoral imaging studies should be opted for. Rubber dams should be applied and used. Good ventilation and strict, regular surface disinfection with alcohol or chlorine disinfectants should take place.

Expert commentary by Walter L. Siqueira DDS, PhD
The paper by Li et al is a short review article that discusses the importance of saliva for the transmission of SARS-CoV-2 and the diagnosis of COVID-19. The importance of this manuscript lies in the discussion of the potential infection pathways (e.g., salivary gland) for spread of the disease. It further reinforces the importance of additional protective methods to reduce virus transmission during dental procedures.

Access full post: https://covidprotectivemeasures.practiceupdate.com/


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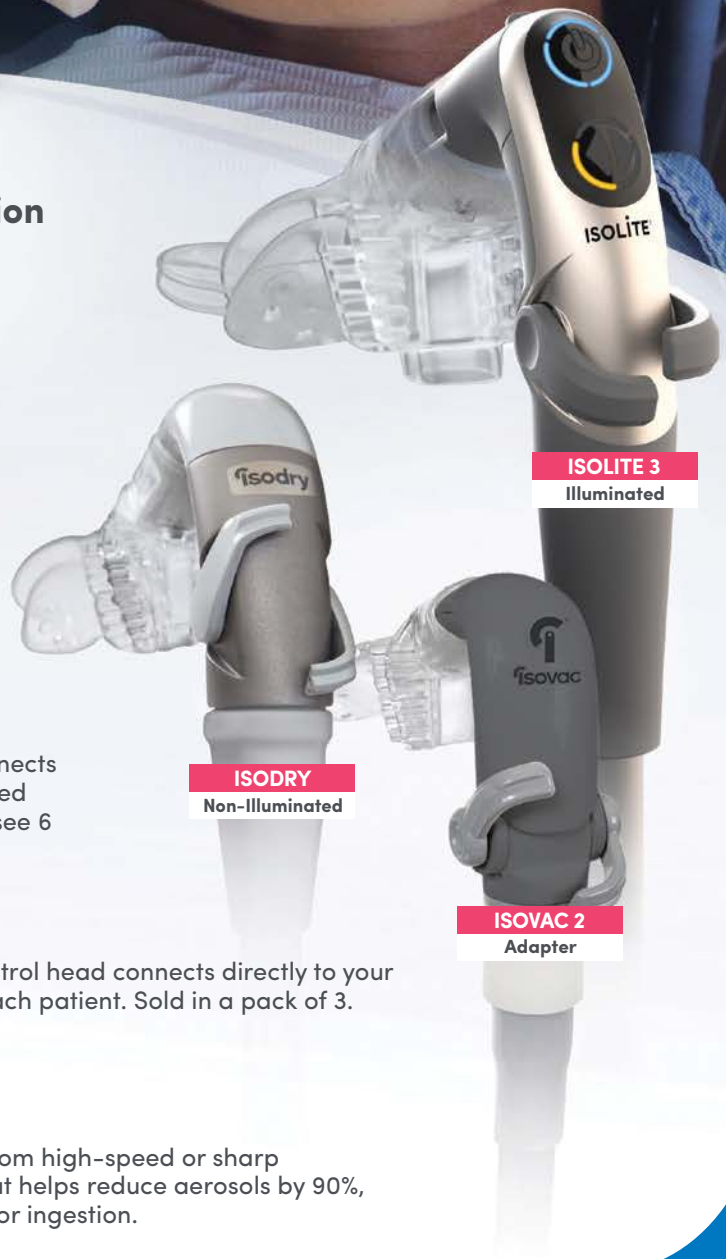

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