

BENCO DENTAL | WHITE PAPER

# Applying Design Standards from Hospitals to Dental Practices for Infection Control

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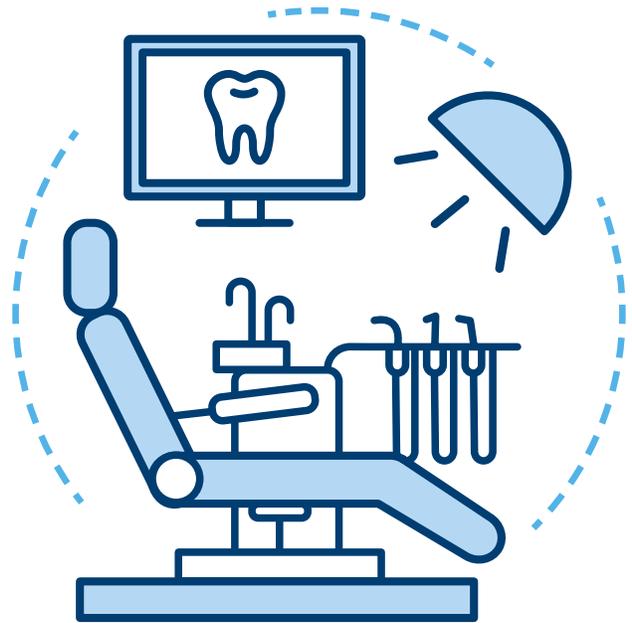


# 01 Abstract

**ALTHOUGH DENTAL OFFICES HAVE ALWAYS HELD** themselves to high infection control standards, industry authorities, including the Centers for Disease Control and Prevention (CDC), have indicated that significant changes must be made to ensure the safety of providers and patients. These governing organizations will be developing new standards; however, a response based in the currently designed environment is needed now.

This paper will review design considerations for post-pandemic dental practices by applying recommendations from the 2018 *Facilities Guidelines Institute (FGI) Guidelines for Design and Construction*.<sup>1</sup> It will examine how standard dental office design can be modified using hospital standards as a baseline for post-COVID-19.

Safety measures can be implemented along a spectrum, and this paper explores the impact of implementing the “full spectrum” of measures, though not all concepts need to be applied simultaneously or universally. The emphasis will be on defined separation of functional zones, accommodation for new infection control strategies, testing, decentralized waiting, and negative pressure and air filtration strategies.

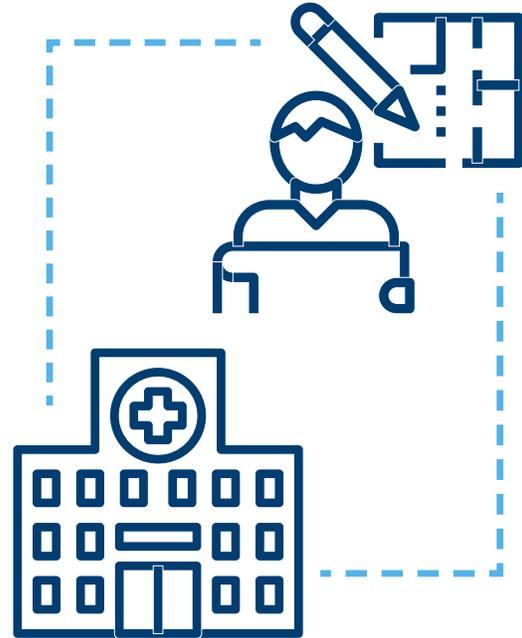


<sup>1</sup>“Guidelines for design and construction of outpatient facilities,” *The Facilities Guidelines Institute, 2018.*

## 02 Better Design Makes Infection Control Easier

**HOSPITALS IN THE U.S.** have set the medical industry standard for infection control. Inherent in their best practices are design methodologies that can also be applied to dental practices to up-level patient success.

By law, hospital design is required to meet safety codes and guidelines established by a coalition of regulatory agencies which include the Centers for Disease Control and Prevention<sup>2</sup>, World Health Organization, and Occupational Safety and Health Administration. This joint effort is published in the *FGI Guidelines for Design and Construction*. Hospitals and health care facility designers consult this resource to prepare their plans for approval by the Department of Health, secure building permits, and the like.



Currently, dental practice design is not subject to hospital-level codes and regulations, though many dental patients and caregivers would benefit from their application.

<sup>2</sup>"Interim Infection Prevention and Control Recommendations for Patients with Suspected or Confirmed Coronavirus Disease 2019 (COVID-19) in Healthcare Settings," Centers for Disease Control and Prevention, April 13, 2020. Retrieved from: <https://bit.ly/32Rk0LP>

# 03 A Comparison Between Pre- and Post-COVID-19 Design

IN THE EXAMPLE ON THE NEXT PAGE, FGI guidelines are applied to a traditional pre-COVID-19 dental practice to demonstrate how a post-COVID-19, infection control-focused practice would look.

This design maintains the overall facility size and

customary operatory layout and function, while applying hospital-level standards to all other areas of the practice. The modifications show how spatial, programmatic, and procedural updates would be implemented as dental regulations evolve toward medical regulations.

## 1. REDEFINE AND SEPARATE THE THREE ZONES

Traditional dental design separates the facility into separate functional zones in order to ensure patient privacy and overall efficiency. As a result of COVID-19, however, patient and team safety has become the primary focus of the dental experience. Dental office design must change to accommodate a more defined and secure pathway through the dental office for both caregivers and patients.

When laying out a dental space, the designer separates the area into three zones, aligning with how the space is used: public, where patients are greeted and business is transacted; team, where the staff can regroup and recharge; and clinical, where caregivers treat patients. The design goal is an office that is streamlined and efficient.



The pandemic means the **PUBLIC ZONE** is now a potential source of cross-contamination, with hallways as dangerous as treatment rooms. Therefore, it's necessary that public zones be down-sized, unnecessary interactions between patients be eliminated, and patient screening and information verification be moved online or over-the-phone. An added benefit: patients spend less time waiting in the reception area, which studies show patients hate. [\(Click here for study.\)](#)



The **CLINICAL ZONE**, where providers interact closely with patients, needs to be designed and operated as if each patient and visitor could be the source of infection. In a COVID-19 environment, patient corridors, previously considered a neutral area, should be considered clinical spaces for the purpose of design and infection control, subject to the same level of finish and maintenance as treatment rooms.

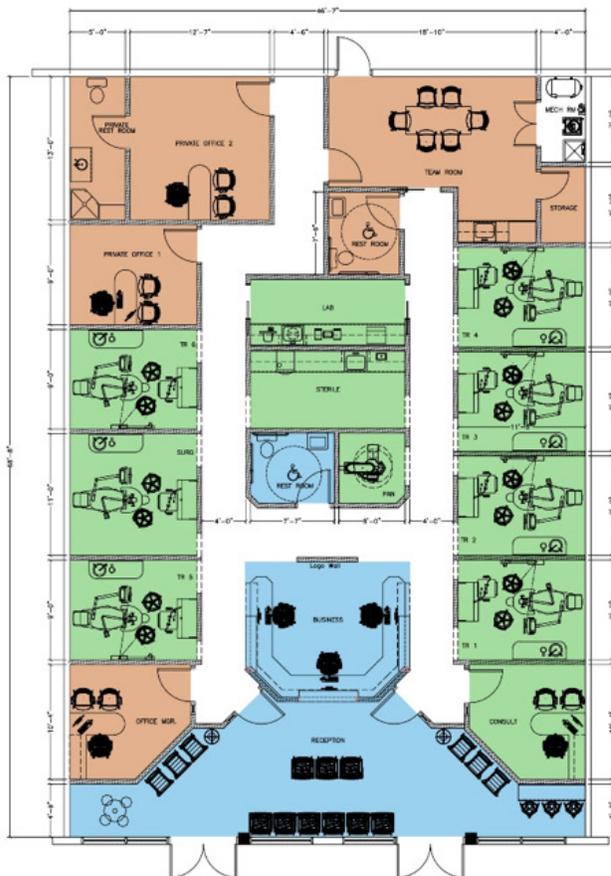


The **TEAM ZONE** needs to be contiguous to keep staff space segregated from patient space, allowing for better environmental controls. And the team area will require new rooms designated for changing and cleaning uniforms.

# 04 A Comparison Between Pre- and Post-COVID-19 Design (cont'd.)

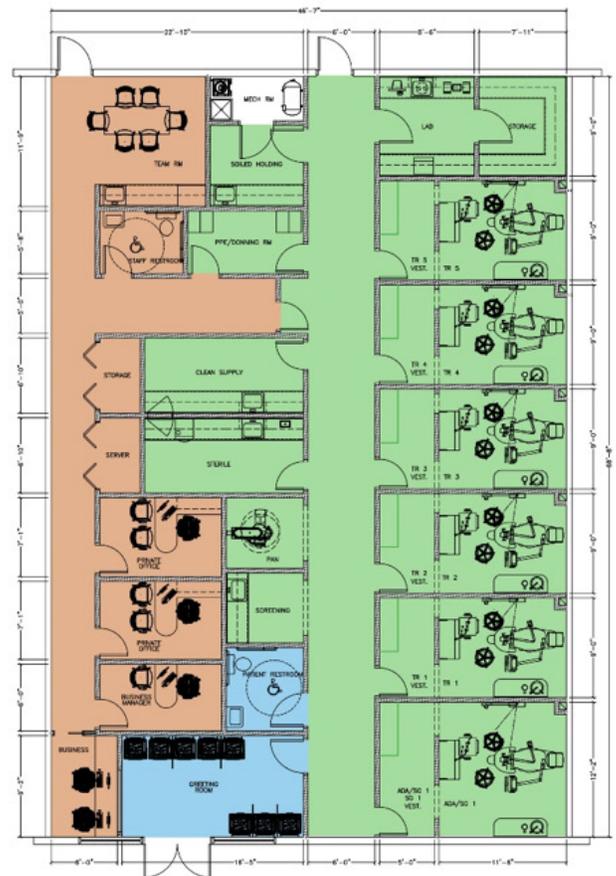
The new design concept utilizes physical barriers to separate one zone from another: closed operatories, single-use hallways and corridors, and a more purposeful office flow. The result is an office that makes patients and staff feel more comfortable and safer, and a facility that is easier to clean and maintain.

## COMPARISON OF ZONE STUDIES BETWEEN 2019 (LEFT) AND CONCEPTUAL (RIGHT) FLOOR PLANS



ACTUAL DESIGN SCHEMATIC 9-23-19  
3197 USABLE S.F.

- CLINICAL ZONE
- PUBLIC ZONE
- TEAM ZONE

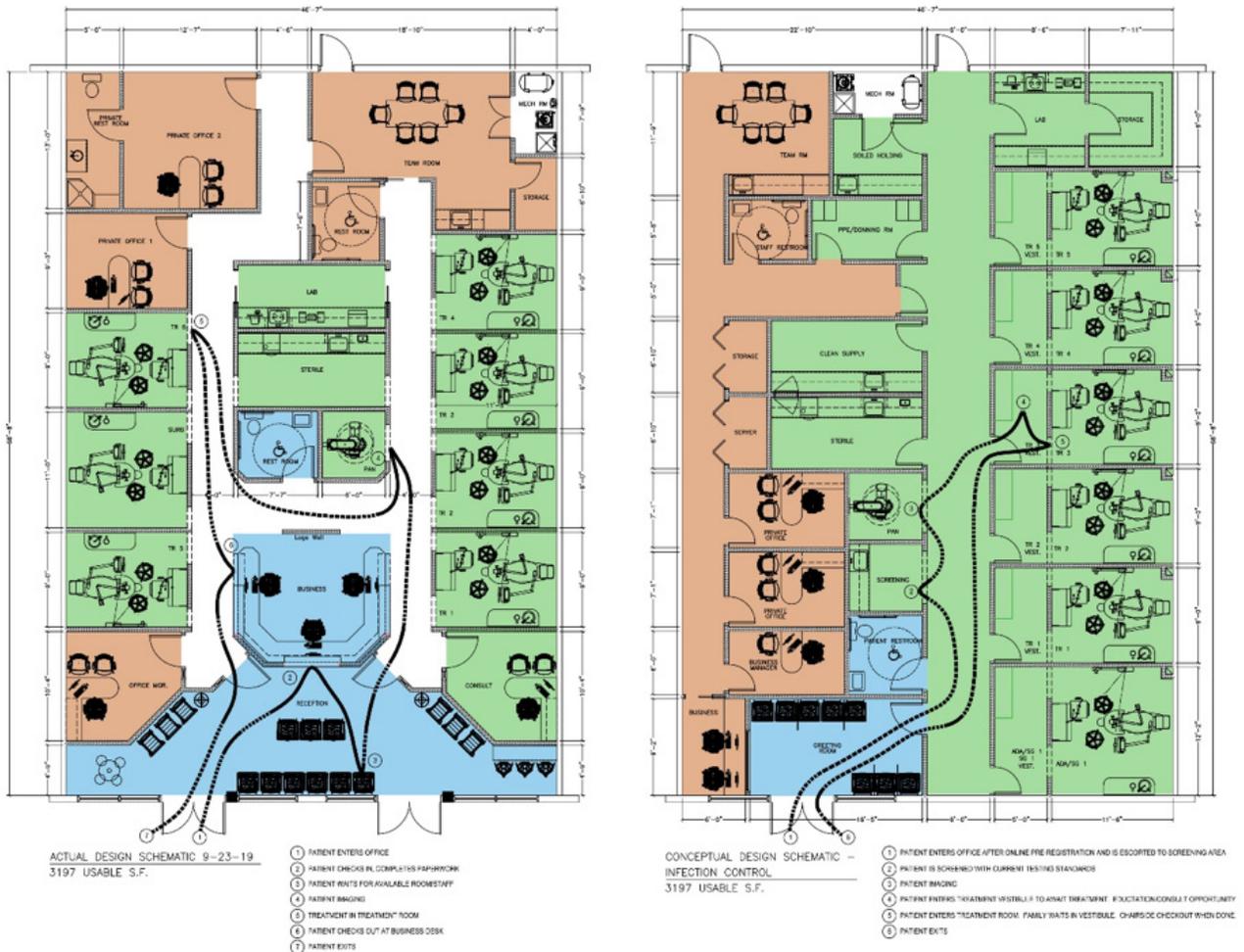


CONCEPTUAL DESIGN SCHEMATIC - INFECTION CONTROL  
3197 USABLE S.F.

- CLINICAL ZONE
- PUBLIC ZONE
- TEAM ZONE

# 05 A Comparison Between Pre- and Post-COVID-19 Design (cont'd.)

## COMPARISON OF PATIENT TRAVEL PATHS BETWEEN 2019 (LEFT) AND CONCEPTUAL (RIGHT) FLOOR PLANS



## 2. FOCUS ON A CLOSED NOT OPEN LAYOUT

Other healthcare disciplines rarely, if ever, utilize open-space design. From hospitals to physicians, generalists to specialists, almost every patient visit or procedure takes place in a fully-walled off room, behind a closed door, in large part to prevent cross-contamination and ensure privacy.

Historically, dentistry has stood apart from the rest of healthcare for utilizing an open design strategy prioritizing efficiency and comfort. In a post-COVID-19 environment where safety is more important, dental design will begin to adopt conventions from other areas of medicine,

starting with two key spaces: treatment rooms and sterilization/inventory centers.

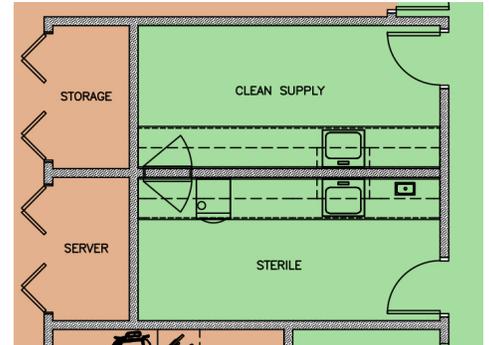
Prior to the current pandemic, practitioners could choose between open and closed operatories, with many choosing open to facilitate movement between treatment rooms and promote a more casual feel in the office. But open spaces also make it easier for airborne pathogens to move throughout the facility, violating a key doctrine of infection control protocol. Closed operatories, on the other hand, prevent infectious viruses from traveling between rooms.

# 06 A Comparison Between Pre- and Post-COVID-19 Design (cont'd.)

While not required, dentists currently practicing in open operatories should consider retrofittable solutions that will economically close up operatories.

Likewise, open sterilization centers have been a hallmark of dentistry since the 1990s, when modular casework solutions were introduced. These units were quickly adopted because they supported a rigorous 'dirty-to-clean' sterilization process and moved the sterilizer from the back closet to the center of the office. Compared with medical, however, current dental sterilization centers don't draw a clear enough line between dirty and clean, allow for too much user error, and store sterilized cassettes in close proximity to contaminated instruments.

One solution is pictured here: a centrally located sterilization system design that clearly separates contaminated instruments from sterilized and wrapped cassettes, with a direct pass-through to a closed inventory storage area that can be accessed easily by the staff. The result is a single storage area for all supplies and sterilized instruments.



## 3. ACCOMMODATE DONNING AND TESTING PROTOCOLS

As the world struggles through a pandemic in which Americans have died and healthcare safety codes remain in flux, experts agree that increased usage of personal protective equipment (PPE) and patient screening will be fundamental elements in dentistry's infection control protocols. While one of these concepts is preventative and the other is diagnostic, both share a need for programmed space located on specific caregiver and patient paths of travel.

Should point-of-care (POC) testing be integrated into a dental practice's workflow, this screening area could be equivalent to the vitals room in a hospital or clinic, providing the opportunity for the medical professional to assess the patient and determine the treatment plan. POC testing is commonly considered the beginning of treatment; next, the patient can continue to imaging, which should be adjacent to and on the same pathway.

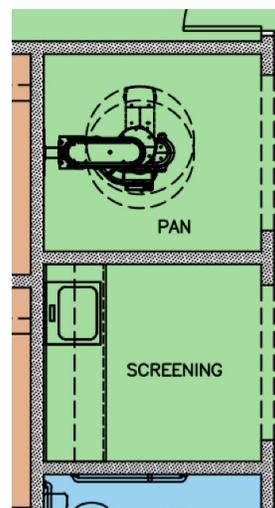
PPE includes, but is not limited to, face shields, gloves, masks/respirators, gowns, caps, and shoe covers, and will likely be a part of the new uniform for staff members for the foreseeable future. Aside from increased storage needs, a donning room should be designated where providers can apply this gear over their office uniform before entering the clinical zone. This room can only be used while traveling from the team zone to the clinical zone in order to properly maintain the separation between clean and dirty.

Whether using disposable or reusable PPE, dental offices will see an increased in soiled materials that

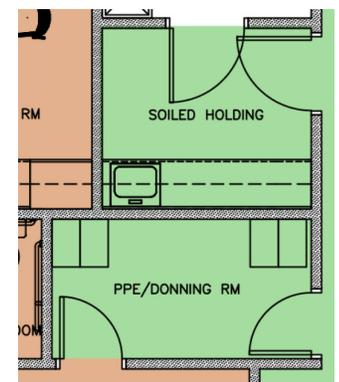
must be handled safely. A soiled holding room provides a dedicated storage space for potentially contaminated PPE. This isolated area allows for controlled disposal or decontamination.

Both the donning and soiled holding rooms should have appropriate casework for clothing storage, as well as sinks for hand washing.

Together, these areas will prove to be critical in managing infection control for a post-COVID-19 office.



**ABOVE: SCREENING ROOM FLOOR PLAN LOCATED ADJACENT TO PAN ROOM**



**ABOVE: EXAMPLES OF A DONNING AND DOFFING ROOM BETWEEN THE CLINICAL AND TEAM ZONES**

# 07 A Comparison Between Pre- and Post-COVID-19 Design (cont'd.)

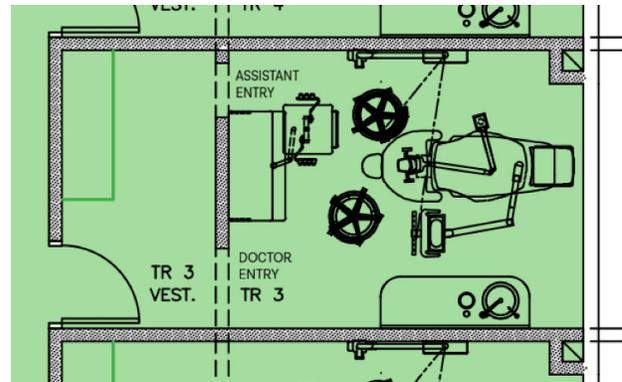
## 4. MAKE WAITING A PRIVATE PATIENT EXPERIENCE

Personal distancing has become a requirement of everyday life as individuals minimize exposure to COVID-19 and other airborne infectious diseases. But personal distancing protocols can be unsettling to an anxious patient. Experts believe that the right design can make social distancing organic and intuitive for even highly stressed patients.

A small waiting area, or vestibule, directly adjacent to each operatory serves several purposes and provides new opportunities to the practitioner. First, the patient and any guests can be brought to a private seating space, allowing them to avoid potential distancing issues in the waiting room. And the vestibule can provide an area for individual patient education and entertainment.

Responsible selection of materials and design will allow this area to be quickly sanitized between appointments, something that is often impossible

with current reception space design. This new room still allows for traditional practice flow, with separate entries for doctor and assistant.



**ABOVE: CONCEPTUAL PLAN SHOWING A PATIENT VESTIBULE OUTSIDE A TRADITIONAL OPEN OPERATORY**

## 5. DESIGN WITH AIR IN MIND

### IN A DENTAL SETTING,

practitioners need to be concerned with air disinfection in two distinct locations:

#### AMBIENT,

the air flowing throughout the office



#### AT THE ORAL CAVITY,

the air and aerosols produced at the point of care

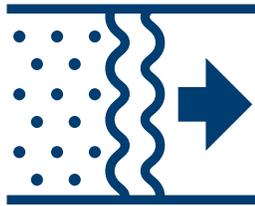


Medical facilities such as hospitals address potentially contaminated ambient air in two ways: removal through negative air pressure or cleaning and capture with filters or UV lights. In either scenario, effectively addressing air quality requires closed operatories, a separate sterilization area, and a clean room for supply storage.

Negative pressure is based on a simple idea: contaminants should be contained in the room where they are produced and cleaned or exhausted safely. Negative pressure rooms are constructed with tight seals around walls, doors and windows to keep contaminated air from moving to other parts of the building. In the dental environment, a mechanical engineer can help design the HVAC system so that it exhausts more air than is allowed in, creating a negative pressure condition.

Beyond the clinical zone, areas should have neutral or positive pressure in order to ensure that air flows out of these areas, because air always flows from positive to negative pressure spaces. A proactive plan around air flow will ensure a steady supply of clean, uncontaminated air in every zone, thereby creating a safe environment for both caregivers and patients.

## 08 A Comparison Between Pre- and Post-COVID-19 Design (cont'd.)



**IN A DENTAL SETTING, CLEANING AND CAPTURE CAN BE ACCOMPLISHED** with a medical-grade HVAC system that uses sophisticated filters to trap or destroy airborne pathogens that might otherwise remain viable for hours and even days of travel through a standard HVAC system.

Several medical companies are currently designing systems to address ambient air specifically for a post-COVID-19 dental office.

Air quality at the oral cavity poses a different challenge. By their very nature, dental procedures (crown preparation, root planing and scaling, and standard prophylaxis cleanings) produce aerosols, which are a prime source of airborne cross-contamination. These aerosols create a potentially dangerous environment for dental caregivers, and even upgraded PPE doesn't provide enough protection.

Dental offices should be equipped with systems that remove air and aerosols directly from the point of care. Today, both portable and installed units are available that can evacuate

contaminated air from the area around the oral cavity during patient treatment. In the future, practitioners can expect common dental instruments like ultrasonic scalers and even handpieces to be redesigned for direct connection to the dental suction, allowing for seamless and immediate removal of aerosols from the oral cavity.

As technologies develop, air quality and handling will become even more vital in dentistry, making the air compressor and dental suction units even more important. These pieces of equipment, always integral to the practice of dentistry, must be upgraded and upsized today to ensure the dental practice is ready for future developments in air disinfection and removal tomorrow.

# 09 Conclusion

**SIGNIFICANT CHANGES LIE AHEAD** for the standard design of dental offices to ensure the safety of providers and patients post-COVID-19. As governing federal, state and industry entities work toward the development of new design standards, this analysis of the existing guidelines from the Facilities Guidelines Institute (FGI) and best practices typically found in hospitals, combined with current social medical precautions, should be used as a baseline for designers and providers.

The FGI guidelines are the medical industry's most widely recognized guidance for planning, designing, and constructing health care facilities. The publication provides direction on space, risk assessment, infection prevention, architectural detail, surface materials, and built-in furnishing requirements in one convenient place.

Closed operatories, decentralized waiting spaces, accommodation for testing, air filtration strategies

and more defined separation of functional zones will contribute to the successful practice of dentistry in a world that must treat airborne pathogens as a potential danger to both caregivers and patients.

## **BENCO'S UNIQUE POSITION**

With decades of LEED AP and hospital design experience, the Benco Design team is positioned to lead in applying hospital design rules to dental practice design post-COVID-19, ensuring patients receive the care they need, and dentists and caregivers stay safe in the dental environment.

Given the breadth and complexity of the broader medical industry, the regulatory agencies that govern hospital and medical facility design will require time and collaboration to agree on new guidelines. In the special niche of dentistry, Benco is uniquely situated to serving its customers.

## **ABOUT BENCO DENTAL:**

**BENCO DENTAL IS THE LEADER** in cutting edge dental practice theory, systems and design. They drive dentistry forward through their innovate solutions and caring family culture. Benco is the country's largest family-owned dental distributor with 1,400 associates across the U.S.

*This white paper is one in a series of information on best practices.  
For more information, visit us at [benco.com](http://benco.com).*

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