e4h ENVIRONMENTS FOR HEALTH ARCHITECTURE

PACE® CENTER PLANNING
IN THE POST COVID-19 WORLD

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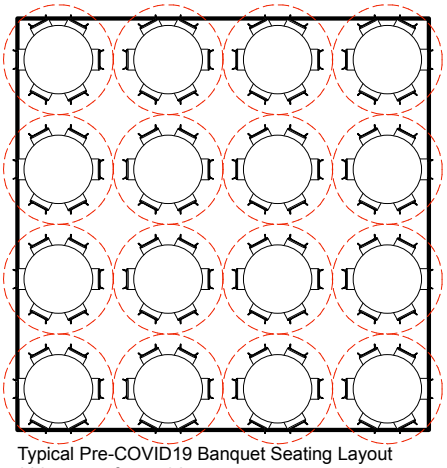
The COVID-19 Virus is infecting people of all ages but data shows that the elderly are most vulnerable and COVID-19 related deaths for residents of long-term care and nursing facilities likely account for more than one third[1] of the pandemic related fatalities in the United States. As of January 2021, the National PACE® Association has reporting[2] that in the 115 provider organizations that were providing data, COVID-19 positive cases accounted for approximately 13% of the total census of those Provider Organizations. Moving forward, PACE® programs are now planning to identify solutions to manage current and future pandemics so that their programs and facilities are better prepared to respond. From new protocols for entry into a facility to fundamental changes in center design, there are short and long-term strategies owners can implement to increase the safety of their facilities.

While a PACE® Program is larger than the building it occupies, the Center has been the physical heart of the day to day operations. It is the place that participants, by and large, have seen as their home away from home. Like any congregant type spaces (i.e. schools, daycares, restaurants, offices, et. al.) there are inherent challenges in the face of a virus like COVID-19 which predominantly spreads through contact between people and high touch surfaces. This raises a lot of questions. How can we safely have staff and participants in the building on a regular basis? What impact does the concept of 'social distancing' on how we occupy and use our Center? With the current mandatory increase of home-based care services, is the Center even necessary anymore?

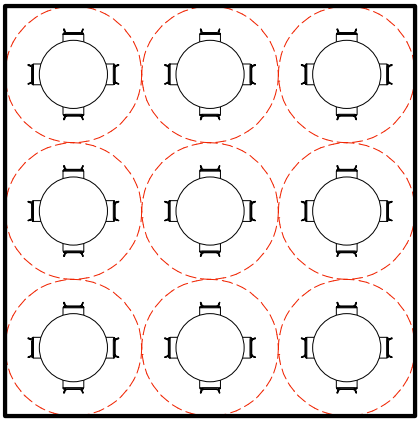
The following sections reflect some of typical protocols used to combat the spread of a pathogen like the coronavirus, how they can impact the planning and design of the Center. The final section takes a high-level look at designing the 'post-coronavirus' generation of Centers and imagines how PACE® can continue to be an effective model of care for our elderly family and community members.

1 - https://www.nytimes.com/interactive/2020/05/09/us/coronavirus-cases-nursing-homes-us.html

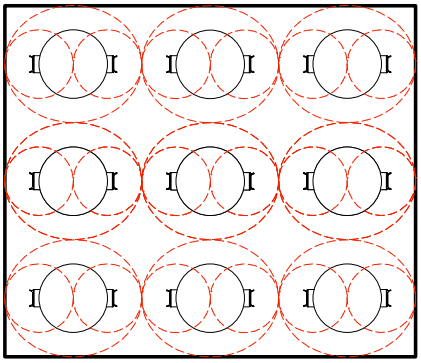
2 - http://www.magnetmail.net/actions/email_web_version.cfm?ep=ca_YefN7oYwvTxovdbXvvnauvcu1qRp0uhSSlVt8mPA_-BOHQ3mLkAxPU6gHAOiryX8cvAOttxFX73OGQvekZzvFWg7ErgwpSyLs9Un7d3aRe6nOkTjQh4k3pt9WLzOt



Typical Pre-COVID19 Banquet Seating Layout
900 square feet = 96 seats



Pre-COVID19 PACE Seating Arrangement
900 square feet = 36 seats



Post-COVID19 PACE Seating Arrangement to comply with Social Distancing Criteria
1,100 square feet = 18 seats

PHYSICAL (SOCIAL) DISTANCING

Short of stay-at-home or lock-down orders, I believe that any physical distancing protocols that are required to be in place could have the largest impact on existing Center operations and future Center planning. Under the current model building code that is the basis for most codes in the United States, the area per square foot per occupant in a daycare setting is 35 square feet[3]. In an 10,000 square foot space that would allow for a maximum of 285 occupants. If physical distancing is in effect, the 6-foot minimum spacing creates a minimum demand of 113 square feet per occupant. That same 10,000 square foot space then only yields 88 occupants, which is a 70% loss of otherwise occupiable square footage.

In the reality of planning a PACE® Center however, we are never truly utilizing the maximum possible occupancy allowed. The practical nature is that PACE® participant area demands are significantly greater than typical generic occupant types. A number of years ago, we embarked on a study of nine PACE® Centers across the country to understand how they used their square footage and to see if some guidance could be found for planning purposes. From that research, we established the 85/45 rule. This provides 85 square feet per participant those areas of the Center that a participant will experience, such as day-spaces, exam rooms, physical therapy gyms and the like. The 45 square foot component is guidance for staff only areas such as offices, meeting areas, food service and storage. In total, it means that based on the Average Daily Attendance projection, planners could use 135 square feet per participant to generate an area allowance.

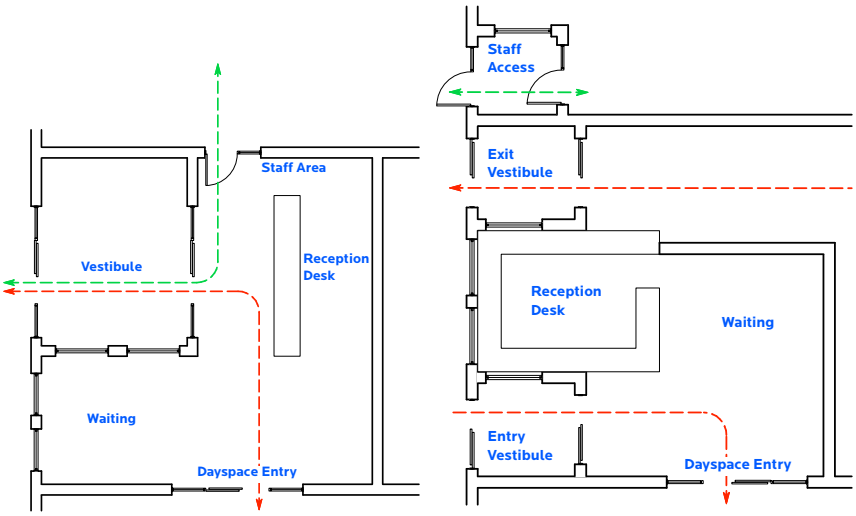
If we do some quick calculations using the 85/45 rule, our example 10,000 square foot space would yield 74 occupants, a still lower occupant load than even standard physical distancing criteria would generate and an almost 75% lower occupant load than model building codes allow. Unfortunately, this does not truly capture the reality of how participant areas are used. Any day center staff will tell you that between wheelchairs, walkers, electric scooters (if allowed), day center aides, tables and chairs each participant takes up a lot more room than expected! In the series of graphics to the right, we have tried to depict some typical banquet-style table and chair arrangements.

3 - https://codes.iccsafe.org/content/IBC2018P4/chapter-10-means-of-egress

Regarding staff-only spaces, all the same is true. Office areas are generally computed at 100 square feet per occupant and conference/meeting rooms are calculated at 15 square feet per occupant. The social distancing impact is small on the office area but quite large on the conference/meeting room areas. The takeaway here is that careful consideration needs to be given to the higher density areas like meeting rooms and break rooms with ultimately the decision on either limiting occupant loads or increasing size to allow for regular use.

In lessons we have learned from other areas of our practice is the idea of separating entry and exit points. For PACE®, the general approach of the years has been to have a single controlled point of entry and exit from the facility. This has allowed for staff to control participant and visitor flow to and from the building efficiently and effectively. We are now in the process of looking at how separate entry and exit points can be designed that still allow for the efficient use of staff and minimized amount of dedicated floor area. Below are two concepts that we are developing:

In it, there is still one reception/control desk that handles both inflow and outflow. The desk staff maintain clear visual command of both interior and exterior spaces, bottle-necking is minimized and access is secured and controlled.



Traditional Center Entry **Redesigned Center Entry**

Considering that physical distancing protocols will not always be in place leaves the question: Do we really need to design for the worst-case scenario? If the center is designed for maximum occupant load, then I would say yes, there needs to be some accommodation for worst-case scenario planning. You will not magically find the additional square footage that you need, which could possibly be close to 300% more. Other possible operational strategies such as time-shifting or going from a 5 day per week to 7 day per week schedule will also likely not suffice in total. If in the planning stages, you build in some of that flexibility by either programming a more generous per participant square foot allotment or by having access to additional on-demand square footage (like an empty tenant space next to your center) then you will have the resilience to adapt when needed.

INFECTION CONTROL

All PACE® operations include protocols in their regulations for infection control[4], but given the situation that arose with the ease of transmission of the novel SARS-CoV-2 virus and resulting COVID-19 illness, additional aspects of infection control may need to be considered for the planning, design and operation of PACE® Centers. Two areas of common concern are high touch surfaces that are likely to carry an infectious agent, also known as fomites; and the use of air circulation to minimize spread of an air-borne infectious agent or pathogen.

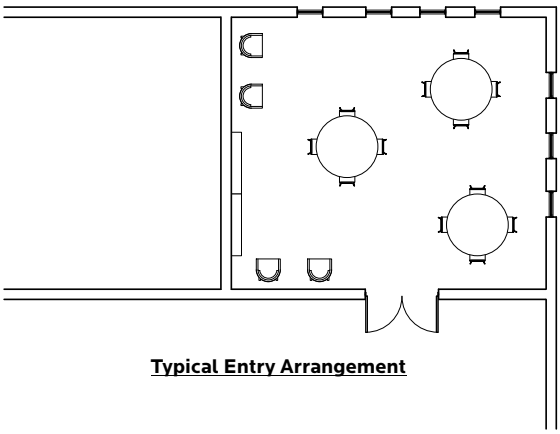
HIGH TOUCH SURFACES

High touch surfaces in PACE® Centers generally include door hardware, service counters, toileting fixtures and controls, cabinetry handles, handrails and furniture. Some of these items can be redesigned, such as doors, but others will continue to be treated the same as they have been with regular cleaning and disinfection. Touchless toilet room controls are readily available in the marketplace, are easy to retrofit to existing fixtures and economically priced. Many, if not most provide the option of battery power so that power wiring is not required. On our projects, we specify solid surface materials, such as Corian®, for any high touch services counters like a reception desk, nursing station or exam room. Solid surface materials are inherently non-porous while plastic laminate surfaces can be porous if incorrectly specified. This aspect provides little 'grip' for micro-organisms and viruses alike. Even given the limited ability for the virus to grip a surface, an NIH study[5] found that it will still live for up to 2-3 days without additional infection control purposes.

This leads us to the one element that can potentially have the largest impact on planning and design – doorways. All Centers have numerous doorways. Our projects generally have a minimum of 75 doors and the largest ones have well over 125. That provides a lot of potential for contact transmission. Some options available to minimize contact include antimicrobial coatings, no-touch door operators or designing to remove doorways entirely. Currently, there is not enough proven data to suggest that antimicrobial coatings have any effect on a virus like SARS-CoV-2 and antiviral coatings are not yet commonplace. With that said, specifying antimicrobial coatings on door hardware in any healthcare setting should be a given as the benefits greatly outweigh the costs.

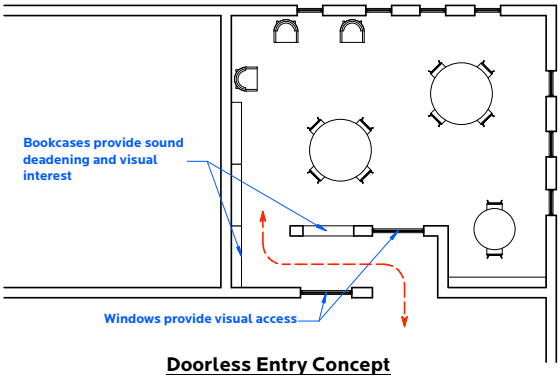
4 - https://www.cms.gov/Regulations-and-Guidance/Guidance/Manuals/Downloads/pace111c07.pdf

5 - https://www.nih.gov/news-events/news-releases/new-coronavirus-stable-hours-surfaces



Typical Entry Arrangement

No-touch door operators minimize the amount of surface contact required, but they do add expense and possibly require additional building area to operate properly. These types of doors are generally found in clean areas, intensive care units and isolation wards in laboratory and acute healthcare setting so they are readily available. One PACE® specific concern with door operators relates to use by the participant. Doors are fairly simple mechanisms that we are all very familiar with. Given the varying levels of dementia in the general PACE® population, introducing an unfamiliar element such as an automatic door operator can create anxiety, stress and possibly strong negative reactions. Care should be taken in the earliest stages of planning to understand what the possible clinical dementia ratings are for the community being serviced.



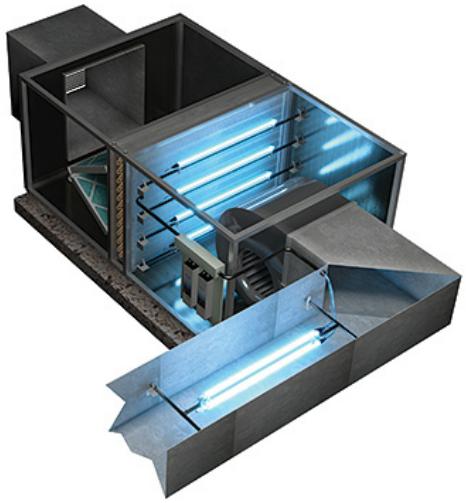
Doorless Entry Concept

The final door option under consideration here is to look at ways to incorporate door-less access. While removing a door completely eliminates the need to touch anything to access a space, the reality of removing a door is not so simple. From an overall planning perspective, priority needs to be given to spaces that require security or privacy. Most, if not all, PACE® Centers feature some level of access control so that participants are not able to move freely into areas that could be a threat to their well-being or are not monitored by staff. By nature, these transition points require a door with proper hardware. Areas that do not require the same level of security or privacy can easily be assessed regarding the need for a door or not. Participant spaces that are used for quiet activities for example, can be designed so that the entry sequence creates a natural sound baffle that minimizes louder noise coming from adjacent areas.

HEATING, VENTILATION, & COOLING (HVAC) SYSTEMS

HVAC system types vary from facility to facility. Based on model code requirements, all PACE® centers regardless of the building code classification used, are required to have mechanical ventilation as its primary system for heating and cooling. Newer systems will also have requirements for outside (fresh) air that is mixed into the re-circulated air already in the building. Regardless of the type or age of the system in place, there are some additional measures that can possibly be applied to existing and new HVAC systems to help minimize the spread of the virus within PACE® Centers.

- Enhanced Filtration- For any particulate that is pulled into the HVAC system, enhanced filtration can be effective. Each system should be analyzed to determine if the units have sufficient capacity to add filtration and/or increase the rating of existing



filters. HEPA filtration is a commonly known level of filtration but is not always an achievable option for existing systems due to the density of the filter and the inability of the fan to push air through it. Filters for commercial applications are generally rated on a MERV (Minimum Efficiency Reporting Value) scale of 1-16. MERV 7 is typically found in commercial systems. Healthcare related facilities typically run filters that are MERV 14, which will remove a minimum of 90% of the particulate from the air passing through the filter. HEPA filters for comparison remove a minimum of 99% of particulate.

- Increasing the airflow (both recirculated and outside air) throughout the Center to help 'flush out' the building. A simple way to assist in this is to have operable windows with insect screens. This allows fresh outdoor air into a space that may have a basic HVAC system servicing it. More complicated but commercially standard HVAC systems are now required to provide a minimal level of fresh air that is introduced directly into the machinery and filtered prior to being distributed into the Center. Various studies have shown that doubling the amount of outside air into a space can reduce the risk of infection by almost half[6].

- Maintaining proper relative humidity levels inside the center can also help control air-borne viruses. At typical indoor temperatures, maintaining the relative humidity between 40 and 60% has been shown to be detrimental to the survival of many viruses. Based upon studies of viruses, a higher relative humidity also decreases airborne dispersal by maintaining larger droplets that contain viral particles, thus causing them to deposit onto room surfaces more quickly.

- Regular cleaning and sanitizing of HVAC equipment will help to minimize the buildup of dust and moisture, which can foster the growth of bacteria and hold viruses within the system. Ductwork systems may be sanitized with aerosol sprays of disinfectant solutions or UV lamps which allow for continuous sanitization of the duct systems when properly applied. While aerosol cleaners can neutralize coronavirus that may be trapped within the ductwork system they should only be used in unoccupied spaces where the disinfectant can recirculate through the space.

- Other techniques such as UV light systems and ionization systems are available but typically require a significant re-working of existing systems. If they are incorporated into the system design from the beginning, they will be more cost effective and functional.

6 - https://onlinelibrary.wiley.com/doi/epdf/10.1111/j.1600-0668.2006.00443.x

CONCLUSION:

A Speculative Look At The Future PACE® Community Center

Moving forward, it is clearly difficult to say with any certainty what lasting changes from the pandemic will impact the future design of PACE® centers. The data acquired over the last year indicates that PACE® programs are a safer alternative to residential facilities, but the Center is only a part of the broader program and is prone to many of the same problems.

For instance, infection control will be more persistent and pervasive from this point on, but physical/social distancing requirements will likely wane over time. Will families want their loved ones to spend large portions of a day in spaces with a large group? Will they demand limited group size? Or will Center attendance drop to the point that the cost of the day spaces no longer makes sense? Provider organizations have proven that they can adapt quickly to home-based care. Now that participants have been out of many centers for extended periods of time and have not had the social aspects of the program, what has been the effect on their physical, mental and spiritual well-being? Telehealth and social technologies are not one for one replacements for personal interactions with care providers and friends at the Center.

So, what are some of the physical changes that we can expect to see? From where we are right now, we expect that the clinical spaces in the Center will be the first areas to evolve. The HVAC systems for those spaces will be separated from the other parts of the facility so that they can be used in isolation. This will allow these spaces to run with negative pressure, much like an isolation ward in a hospital can. There have been conversations recently exploring the feasibility of overnight stays for participants as well. This alone would expand the physical needs of the clinical areas to include accommodations for 24-hour staffing, provisions for meal, janitorial services and bathing spaces. If design is to accommodate future physical/social distancing requirements, clinical staff areas will need to grow accordingly. Special spatial considerations will also need to be provided for telehealth consultation. Private areas where care staff can sit down, have proper lighting, audio control and acoustic separation from other spaces are an important part of successful telehealth transactions.

The other obvious areas that will evolve are the day spaces at the heart of the Center. How they will evolve will depend on many factors, most of them local to the program and the particulars of their operations. At a high level, we expect that many of the changes will be subtle in existing facilities and more pronounced in newly constructed facilities. New facilities may see an increase in overall size to allow for additional flexibility, more but smaller day spaces that naturally limit group size, the use of more single occupant toilet rooms versus gang-style toilet areas, provision of larger outdoor space features and advanced ventilation systems. Existing facilities that are not undergoing renovation, will see more programmatic than physical changes. The physical changes they do undertake will likely be limited to upgrading the ventilation systems, inclusion of stand-by electrical generators for parts or all of the facilities and efforts to increase storage capacity either onsite or remotely with easy access. Programmatic changes will likely look at more managed and/or restricted center attendance as well as the expansion of Alternative Care sites to alleviate potential crowding and streamline certain services that can be de-centralized from the full Center.

Finally, in our conversations with many thought leaders in the PACE® world, one question has consistently risen to the surface: how can PACE® be more widely combined across the country with a housing component? These experts feel quite strongly that for PACE® to continue its successes of the past, it will need to evolve to the point where is can be a truly all-inclusive care provider that not only meets the medical, social and behavioral needs of it participants but also works to secure safe and healthy housing for them. Currently, there are a small number of providers that are modelling this around the country. Many programs and consultants are watching closely how this expanded model fares in relation to the pandemic and consider if their outcomes are any different than those of providers that do not have a housing component. Needless to say, if housing were to become an integral part of the model, the overall impact on Center design will be far greater than that of the current pandemic. We believe that this is a great topic for a future white paper.

Thank you for your interest and time in this topic. We would love to hear your thoughts, questions or comments on this material. Please feel free to reach out to Rich Carroll at richard.carroll@e4harchitecture.com.

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