DESIGNING FOR EMERGENCY PREPAREDNESS

CONSIDERATIONS TO REDUCE THE SPREAD OF DISEASE AND INFECTION IN OLDER ADULT COMMUNITIES DURING AN EMERGENCY
The CDC states that infection spread occurs when germs enter the body, increase in number, and cause a reaction in the body. Three things are necessary for an infection to occur: a source, a susceptible person, and transmission. With the older adult population in the high-risk category, considerations must be explored to incorporate design solutions that can be implemented during an emergency to reduce potential germ source interaction within a community and seek to reduce germ transmission.

Senior Living communities such as Assisted Living and Independent Living have moved away from the healthcare oriented design of facilities of skilled nursing and hospitals in order to bring the feel of home and emotional wellbeing to the residents and care givers. However, new design challenges have arrived as highlighted by the recent COVID-19 pandemic, showing that the older adult population can be highly susceptible to disease and infection spread in common living communities. Given the highly residential and hospitality design influences currently in use, it would be detrimental to address this health need by simply converting these environments back towards a higher acuity medical setting. Instead designers should utilize strategies to incorporate - but conceal - these components or make communities easily convertible so they add potential to stay healthier.
Residents may need to be quarantined from the central common areas of the community. Localized common space in each resident wing can be planned to be big enough to support a common living and eating area meeting regulatory compliance.
Larger assisted living and memory support communities could be designed as a cluster of smaller household models with a common node. This connectability can allow for staff and resource flexibility in an emergency situation, while maintaining the benefit of fewer individuals in contact with the separate households. Amenity and outdoor spaces intended for visitor interaction limit visitor travel farther into the community.
Utilizing zonal isolation can ensure that residents and employees are not only isolated from contact spreading and physical cross contamination, but also through droplet and particulate exposure through air. Isolation Zones can be large zones including building wings or smaller zones such as individual guestrooms or apartments. Systems can be designed to operate behind the scenes, improving indoor air quality constantly, or designed to remain dormant until engaged by operations as needed.

Secondly, reducing the risk of contamination inside each zone should be accomplished through filtration and purification of air side systems. Filtration and purification of each air side system allows for the removal of any particulates, bacteria or viruses that do happen to make their way into these zones and the mitigation of spreading these inside the zone. All zones should be installed with HEPA Filters and replaced regularly by maintenance operations.
MEP – ELECTRICAL & PLUMBING

CHALLENGE
Reducing source transmission of germs to susceptible persons through electrical and plumbing.

Through exploring new materials in plumbing fixtures and technology solutions for electrical system controls, it may be possible to reduce transmission of germs. Most, if not all, contact delivery of viruses is done so from human to human contact. As a result, it is important to design combative measures to address regularly touched surfaces.

While the items described here are not intended to be comprehensive, it should be apparent that by utilizing some of the systems mentioned buildings can be designed to be more proactive in stopping the spread of diseases.

Most plumbing fixtures are typically used every day and as a result can become hot spots for viruses and bacteria. To help combat this, plumbing fixtures should have anti-bacteria surfaces, smart controls and touchless operations. These design solutions can greatly reduce “touches” on the common surfaces and can help combat the spreading of germs.

Also, it is recommended that any light switch or control device used in the building that is classified as public (used by more than one or members of more than one household) be provided with touchless operation. An EMS in conjunction with motion sensor lighting can greatly reduce the amount of touching, flipping, pressing and operation of wall items that would typically be used daily. This allows for less touching and therefore less chance of contact spreading.
COMPARTMENTALIZE

SMALL HOUSE MODELS

**CHALLENGE**
Reducing source transmission of germs to susceptible persons.

By minimizing the number of residents congregating it can be possible to reduce the number of potential germ sources those residents will encounter. The small house model, which generally has 10-12 residents and 2 staff, minimizes potential transmission sources.

The small house model typically contains 10-12 suites which can be broken into smaller neighborhoods. Food can be stored, prepared, and served within the household’s community kitchen and adjoining dining space. A single community table is often used for meals, but during times of social distancing smaller separate tables can be used. Airflow can be broken into zones covering the individual corridors and common area.
The small house model can be taken vertically to accommodate more residents on a single smaller footprint but keeping each floor to a maximum of 12 residents depending on acuity level and suite size. Floors can be interchanged during design to attain the preferred resident mix. Floors containing outdoor green space can be inserted into the vertical stack to promote outdoor access without going to the ground floor.
Several design considerations could eliminate or reduce otherwise regular entry into older adult communities by outside persons. These outside persons include mail carriers, package handlers, food and supply deliveries as well as 3rd party staffing sources for salons, fitness areas and flexible exam rooms.

**CHALLENGE**
Reducing outside sources from entering the community or minimizing the distance into the community they travel.

Locating all outside services related spaces served by third party operators in one area, accessed from a single entry significantly reduces outside source interaction within the community. Further, these spaces can be architecturally designed to look like shopfronts giving the appearance of mixed-use design for visiting the salon or barber, fitness clubs, and more.
Often, mail and parcel deliveries are brought to the front desk or to a mail room located close to the building’s core. A design consideration is to move the mail room to an exterior wall and incorporate rear-loading mailboxes or automated parcel lockers to reduce exposure to outside sources.
Creating a receiving room with refrigeration and storage on the perimeter of the building allows for a landing zone for food and bulk good deliveries prior to further distribution within the facility. The receiving room could be negatively pressurized and exchange air directly with the outside to help combat transmission. Further a hand sanitization station should be provided in the receiving room for delivery and community staff alike.
UNIT DESIGN

**CHALLENGE**
Minimizing potential sources from entering resident units or reducing their travel distance within suites.

It is possible for design solutions to minimize access into suites without preventing caregivers from providing assistance to the residents. Placing these components closer to the entry door reduces travel within the unit. Further, it may be possible to develop solutions that allow access to the components from the corridor without having to enter the actual residence in a time of health emergency.

Locating trash in a cabinet adjacent to a corridor wall creates a rated access that allows staff to remove and empty the trash without accessing the unit. Lockable medication storage could be created so staff could access from the corridor, and unit plumbing shutoff valves could be located in this access area to allow emergency cutoff without suite access. Solutions like this could reduce exposure to potential sources within the living environment. The kitchenette sink in the suite can also act as a hand washing station for staff entering or exiting the residence.

Additional considerations to minimize potential sources from entering resident suites during an emergency include automated support such as robot vacuum cleaners and automatic food preparation robots.
Fortunately, there are many products and materials utilizing innovative technology that can help combat the spread of bacteria. Technologies such as Microban® utilize silver and copper ion antimicrobial technology which can be used in solid surfacing, bed rails, powder coated door hardware and grab bars, light switches, textile base materials, and porcelain tile. These technologies work to eliminate microbial growth on products and surfaces without impacting aesthetics.

Additionally, there are a few products on the market that utilize light to kill bacteria. ACTIVE® ceramic employs the oxidation process introduced by photo-catalysis to destroy bacteria that come into contact with its surface making it an excellent candidate for floor and wall tiled surfaces. Broad spectrum UV lights such as Puro Lighting’s M2 mobile disinfecting light can eliminate 99.9% of bacteria and viruses in a space.

In regards to fabric and woven products, there are treatments available such as Crypton® that offer permanent antimicrobial, stain & spill resistant technology. Preservative products such as Interface’s Intersept® or J+J Flooring’s ProSept® can be incorporated into the backing of carpet tile, which protects the tile against a range of mold, mildew, and bacteria, and is especially effective at inhibiting growth where carpet tile seams meet.

Designers should also avoid specifying materials that produce volatile organic compounds (VOCs). While VOCs do not spread and infect a person the same way bacteria or a virus may, its chemicals are known to cause ear, nose, and throat irritation, headaches, nausea, and potentially lead to cancer and/or organ damage.
Design Considerations

In an addition to using materials with advanced antimicrobial technology, there are many considerations we can make when designing interior spaces. Consider using a solid surface or manufactured quartz counter top material over plastic laminate. Laminate is susceptible to de-laminate over tile which exposes its paper core. This core is prone to collecting bacteria and mold more so than a solid, impervious materials such as solid surface or quartz. Unlike laminate, these materials can be installed with seamless transitions between horizontal and vertical surfaces. Not only do they provide a clean appearance, they avoid gaps or crevices other transitions may create.

Certain plumbing fixtures and toilet accessories have advantages over more traditional products and installations. A one-piece fiberglass or solid surface shower enclosure offers a sealed surrounding surface. More traditional tiled shower walls and floors require grout lines, which are notorious for collecting bacteria, mildew, and mold much quicker than a sealed shower enclosure. Silver or copper ion technology can also be infused into a solid surface surround, which can also aid in eliminating bacteria. Technological advances such as hands-free/touch-free technology can be used in bathroom faucets, hand dryers, and toilets among other fixtures.

When considering wall and flooring surface materials, designers should consider how certain finishes are applied to those surfaces. Resilient sheet flooring can be installed with heat welded seams, creating a sealed flooring surfaces. Additionally, antimicrobial adhesives can be used to help mitigate bacteria growth. Avoid wall-covering materials that could trap bacteria or deteriorate over time such as non-commercial grade wall-covering. Instead, utilize vibrant art or paint to create a dynamic, colorful wall accent.

Soft-goods such as drapery and upholstery can help create a more homelike environment, but can also create opportunities for bacteria growth. Installing a decorative window valance at the top of a window may be a better strategy over installing long drapery panels. A tightly wrapped valance is less likely to collect bacteria or come into contact with a person as would a drapery panel. Drapery and upholstery fabric can also be treated with antimicrobial technologies including Crypton® to further combat the growth and spread of bacteria.

CHALLENGE

Minimizing potential sources from entering resident units or reducing their travel distance within suites.
Challenge
How can site design of older adult communities be influenced by considerations that could potentially reduce the spread of germs?

Can site elements be designed in a way that allows distance between individuals to prevent transmission based on proximity?

- Outdoor resting spaces can be designed in a way that allows conversation with social distancing. In an older adult community this could allow visitation between a resident and family member, and can be accomplished in both assisted living and memory support environments.
- Create pull-offs along walking paths at regular intervals to allow individuals using a mobility device the opportunity to create separation without going onto unstable terrain like turf or mulch beds.
- When walking on a sidewalk or path, interaction with others often comes with traffic going in opposite directions. One solution that can be utilized when the outdoor circulation is circular is to create one-way travel. This can also be reversed on specific days to alter more equally distances based on the travel direction.
With older adult communities often imposing restrictions to visitors during a health crisis, virtual conference platforms can offer the ability to not only talk, but to see loved ones. A design consideration would be using a large screen or monitor to make it easier for aging eyes to see the multiple parties on the call.

Person-centered technologies allow someone to have experiences virtually and can make communication with loved ones easier. Platforms like It’s Never Too Late offer a variety of technology solutions from communication to entertainment for older adult residents.

Technology like BikeAround, which consists of handlebars, a pedaling unit and Google Street View software, makes it possible for users to experience places all around the world.

There could be development of a phone app that allows elevator controls to be activated in lieu of using physical buttons allowing reduced contact in the elevator cab.

A single occupant accessible elevator could be designed such that a single user would not come into contact with other residents. In lieu of the typical 1 or 2 elevators in a medium sized community, 4 to 6 single occupant elevators could be combined with a more typical larger group elevator for community vertical circulation needs.

**TECHNOLOGY**

**CHALLENGE**

How can existing technology help to promote healthier environments, and what new technologies might be needed?

Through the use of some existing technologies we can look at ways to maintain social connection as well as mental and physical stimulation during a health crisis where the older adult population may be quarantined from the greater population to reduce the opportunity for source contact.
It’s critical to work with a licensed architect or engineer to verify you are not violating life safety codes in the building’s construction when exploring design considerations like this. Care providers should confirm local licensing requirements to confirm the design considerations do not violate regulations, industry standards or best practices.