The COVID-19 pandemic will require changes to select parts of infrastructure within healthcare building systems, including hospitals, urgent care clinics, and other medical facilities. Healthcare providers are being advised to isolate COVID-19 patients both from the rest of the building's patient population as well as from the healthcare providers that support these patients.

Typically, infectious disease patients represent a limited portion of a hospital's patient population. However, as result of this pandemic, healthcare providers may need to make changes to the ventilation systems supporting the areas of a hospital (or other medical facility) where COVID-19 patients are located.

THE CHALLENGE

» Under typical operating conditions, healthcare facilities provide for patient isolation in select rooms. However, these facilities may need to update building systems ventilation systems to support an effective response to substantially increasing patient loads.

» With the prospect of considerable increases in patient load, hospitals will need to consider a substantial expansion of isolation spaces on a wing-by-wing or building-by-building basis, providing for mechanical isolation of infected patients.

» Outside of select isolation areas, patient spaces traditionally operate with slight positive pressurize, in relation to other adjacent spaces and the outside. Little regard is paid to isolation of individual patient rooms within the facility.

» Reversing space and building pressurization will require an informed strategy of modifying building air handling systems to create as much isolation space as the existing systems can support.
THE CONCEPT

Isolation of patient treatment rooms requires that the airflow from the ventilation system draw air from clean spaces outside the treatment area (patient room) into the room. The air drawn into the room should then be filtered and exhausted to a safe exterior location.

» ASHRAE/ASHE Standard 170-2017, Ventilation of Health Care Facilities, indicates the pressure difference required to maintain a negative pressure is 2.5 Pa or .01” water column.

» As you begin to change standard patient rooms to isolation spaces, the negative pressure relationship between the rooms and the adjacent corridor and the patient rooms to any adjacent patient or support spaces becomes complex. It is not enough to simply make each room negative to the corridor because you could be creating paths for pathogens to move from one room to another.

» Operating Rooms must remain positive to their surroundings. Compounding pharmacies need to remain negative to their surroundings to their adjacent clean spaces while isolating the pharmacy from the COVID-19 pathogens. In implementing modifications to any adjacent wings and/or spaces, the hospital team must insure that these spaces are not compromised.

» While a hospital may want to isolate one wing for the control of the spread of the COVID-19 virus, the building must continue to maintain individual isolation for the control of both COVID-19 and airborne infectious diseases that healthcare facilities deal with on a daily basis.

CASCADEING COLLATERAL EFFECTS

The compounding effect of changing the pressurization of a facility is complicated. In order to change pressure relationships on a wing or building scale, it will require that the building operators take the following issues into consideration:

» The capacities of the installed equipment,

» The implemented control strategies of that equipment and

» The air distribution systems that will be adapted to this new isolation strategy.

While facilities and clinical staff are discussing re-purposing spaces and portions of facilities, it will be important to include support of engineering teams that can both quantify existing system capacities and implement short term modifications and longer term facility upgrades to allow for improved and expanded patient isolation. Through a strategy of immediate system adjustments, supported by physical modifications, improvements in patient isolation can occur very quickly as the crisis develops. This kind of thoughtful modifications to your facilities will be a critical element to managing the infection control potential of any virus whose primary transmission mechanism is by aerosols.

NV5 RESOURCES ARE AVAILABLE TO HELP

NV5 encourages you to reach out to professionals who can provide assistance in modifying your building systems or cleaning your facilities.

NV5 has available and qualified staff for your needs:

» Industrial hygiene experts that help develop and execute decontamination protocols.

» Consulting engineers who can assist in identifying building system modification options and in making short term adjustments to achieve incremental improvements in patient isolation.

» Commissioning engineers and technicians that can support confirmation that the modified facilities can provide a safe and reliable short term solution to the capacity challenge of this virus.

» Building operations monitoring that can improve the visibility and ongoing effectiveness of the modified systems.

CONTACT US

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