
A NorthShore Environmental Services team member wipes down and disinfects the windows inside an Emergency Department patient room. Photo credit: Jonathan Hillenbrand, NorthShore University HealthSystem

**Note:** This resource was published in 2021 and has not been updated. Contact ASPR TRACIE if you need technical assistance.

# Reconfiguring Spaces: How NorthShore University HealthSystem Met the COVID-19 Challenge

**HIGHLIGHT**

*COVID-19 challenged every aspect of healthcare facilities across the country. From patient care to engineering, environmental health & safety, public safety, and food & nutrition—every department and specialty was affected somehow by the virus. ASPR TRACIE interviewed **Michael Fiore**, CIH, Corporate Senior Director for Environmental Health and Safety and Clinical Operations for NorthShore University HealthSystem in Illinois. In this role, he oversees the environment of care, including nonclinical areas that support clinical operations that promote a safe, comfortable and healing environment.*

## ASPR TRACIE

**Thinking back a year ago, as concerns about COVID-19 were starting to grow, what major challenges did you face from a facilities standpoint?**

## Michael Fiore (MF)

Our organization promotes a safe and welcoming environment, which includes a fairly open campus in terms of patient and visitor access. When COVID hit, there was an immediate need to review access in terms of patient and visitor flow. It was critical to understand who was entering and exiting our facilities, their physical state of wellness, and how they were interacting with our staff and patient population. Initially, we implemented physical controls and monitoring to better manage access.

## ASPR TRACIE

**Did you have to do a lot of work to update the buildings' ventilation or update or develop new isolation areas?**

## MF

We already had novel virus management policies in place for general use. Initially, we tried to fit COVID-19 into this general model. This included managing potentially infectious patients in designated isolation rooms in our emergency departments (EDs) and inpatient units, and following general infection control guidelines. However, as those areas became increasingly full, we became more creative and innovative in considering non-traditional spaces that focused on two critical components: air quality and air pressurization. Our goal? To establish and maintain negative pressure where contamination risk was high, permeate as much fresh air as possible, and use dilution principles. When weather extremes

forced us to reduce the amount of fresh air, we used HEPA filtration to remove as much of the viral load in our supply air as possible.

To quickly increase our isolation and negative air flow capacity, we transitioned half a unit (whole units are comprised of 24 beds each) at a time, using HEPA filtered air scrubbers to augment general room return air and vent to the outside, making those entire spaces negative. Eventually, we turned entire units into negative isolation areas, whereby doctors and other healthcare providers who were working within that space always had to wear personal protective equipment (PPE). However, this tradeoff helped facilitate larger scale conversions to isolation "units" in the timeliest and most efficient manner.

## ASPR TRACIE

**That sounds like a lot of coordination with infection control and other teams.**

## MF

One of the keys to our success early in the pandemic was including infection control and other key departments like operations, environmental health and safety (EH&S) and key support service areas up front in any changes we were considering. For example, if you need to add walls to establish pressure differential, you need to ensure those walls meet fire and life safety requirements. Another consideration is operational flow needs, making sure doors are large enough to move beds and have immediate access to critical supplies. Every time we wanted to make one of these changes, we summoned an interdisciplinary team consisting of EH&S, facilities, construction design, infection control, and operations to ensure we were not inadvertently creating new hazards or issues.

## ASPR TRACIE

**Was weather a factor in your COVID safety protocols?**

The change in seasons was challenging. During milder months, we capitalized on outside air to provide higher than the typical percentage of fresh air to spaces to support infection control. This option was less feasible in the winter months, when air temperatures were low. We would not be able to adequately heat the air when it was coming in, and it also could freeze out our HVAC air handling units.

Having identified these challenges in advance, we began our planning in the fall. We reconfigured our filter banks and updated our filter racking to support HEPA filters in HVAC units that enhanced patient and general areas of the hospitals, exceeding the recommended CDC filtration guidelines. By adding filtration, this allowed us to reduce our intake of outside air to 25-30% (versus 100%) during the colder months, which is more manageable especially with Illinois' extremely cold temperatures.

## ASPR TRACIE

**How did you work with facilities to change from open campuses with a lot of movement to decreased flow and access control?**

## MF

We worked closely with our facilities and public safety teams. First, we restricted our hospital entrances. We performed a quick gap assessment to identify access points which identified the many different ways people could enter our facilities. We used mechanical means to lock doors from the outside and card readers to restrict access. As a result, patients were limited to one or two entrances and employees used a separate entrance to minimize the potential for cross-contamination. Signage and wayfinding became critical to ensure these changes were well communicated to our patients and staff.

Initially, upon entry, we checked people's forehead temperatures and asked staff and visitors screening questions. We then switched to using special thermal cameras that read body temperature though the inner corner of the eye. This approach is most accurate even when outside conditions are excessively cold or hot. As a result, thermal camera accuracy shortened the scanning process.

We also paused patient visitations except in extenuating circumstances. More recently, we have modified our visitor policy that follows current COVID positivity rates and our COVID inpatient census, a sign of cautious optimism.

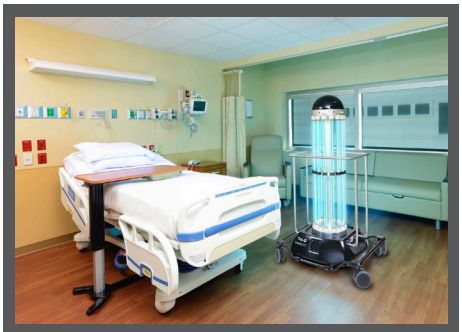
## ASPR TRACIE

**Did you have to adjust the cleaning products you were using to kill the virus? What other adaptations did you have to make to keep the environment clean during COVID?**

## MF

Cleaning routines vary based on the type of environment. For example, even though general areas were much less occupied, we made sure they were routinely cleaned. Fortunately, general disinfectant products, including Virex, bleach, and floor cleaning products, had an appropriate kill factor. For high-touch areas like railings, door handles and elevator buttons, we used a 10% bleach solution. This also had a psychologically reassuring effect: when people smelled bleach, it implied cleanliness. All railings and knobs were wiped down three times per week during this time; elevator knobs were wiped down at least once a day—twice a day during peak COVID times.

In April 2020, we designated one of our facilities as a COVID-only hospital. Units that were COVID-focused had very strict protocols. We added ultraviolet C (UVC) robots (Tru-D and Skytron) to the campus and used first in the cleaning process for those rooms and units. After UV-C completion, our environmental staff (EVS) performed a "terminal clean" using bleach or Virex to wipe down all surfaces, vertically and horizontally. On the COVID units, outside of rooms, we used a bleach solution daily to wipe down high-touch surfaces including railings, keypads and door knobs. We closely monitored team member infection rates which remained below community rates, proving further that our disinfection protocols were working.



*The Tru-D Smart Ultraviolet (UV-C) robot in action. Photo credit: Tru-D® SmartUVC.*

Initially, we had an extensive process for room turnover from one COVID patient to another, using UVC light treatments and a terminal clean. We validated room cleanings by using a 10-point glow check (we had applied ultraviolet glow gel prior to cleaning). We had to score 10 out of 10—meaning no residual—to turn over the room. Anything less than 100% disinfection meant fully re-cleaning the room. As time passed, we realized our terminal clean process had significant enough kill power, so we eliminated the use of UV-C between each COVID patient, thus minimizing turnover time.

It generally took between four and six hours to transition one patient room from dedicated COVID back to a general, non-COVID use room. Overall, it took about a week to transition an entire unit back to non-COVID. This process included an intense cleaning starting with a gross surface clean, followed by the robotic UV-C process. Our environmental services team were fitted with powered air purifying respirators (PAPR) in addition to their glove and gown PPE. The added gear provided a high level of comfort, extra air flow, and protection when performing their job. The next step included the facilities team entering to touch up any walls or evaluate potential deficiencies to ensure a clean room supply and return. Next, our environmental services team performed a full terminal clean, including wiping all horizontal and vertical surfaces (walls and ceilings) with Virex, followed by another UV-C that on average took 25-30 minutes per room. The final step was cleaning and buffing the floor to eliminate any dust that may have fallen, and then one final pass-through with the robot.

## ASPR TRACIE

**Did staff feel uncomfortable working in PPE or with any of the jobs they were assigned?**

## MF

While our staff positivity rate was always lower than the community rate, there were some cases of exposure with our environmental services and facilities staff which led to some initial concerns. We communicated regularly with our team members, including visits from infection control, EH&S and hospital administration to hear their concerns and explain the control measures put in place to ensure their safety. Through the valiant efforts of our Materials team, we significantly augmented our Powered Air-Purifying Respirators (PAPR) program to ensure our environmental services team was part of the PAPR supply allocation. System-wide, we followed a detailed cleaning process for hoods and blowers to ensure team member safety. The PAPRs provided improved morale; and are now part of our mandatory PPE protocol for all environmental staff working in COVID rooms.

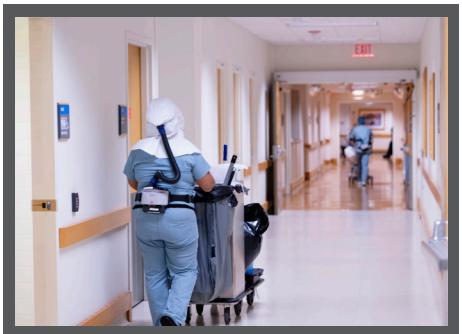
## ASPR TRACIE

**How did you manage food service and waste?**

## MF

We changed our entire food service protocol by transitioning many items from reusable to disposable. To limit exposure, our nursing team agreed to deliver food to patients. We implemented processes to maintain food temperatures for the extra time needed to serve our patients. Additionally, we modified cafeteria options and switched to mostly individually wrapped “grab and go” items.

Unfortunately, our sustainability program was to some degree negatively impacted due to the increase in disposable packaging, though we are now making progress to resume some prior practices in a safe and controlled manner. Overall, from a general waste management perspective, there were no special medical waste requirements, and we made no changes to our program.



*A NorthShore Environmental Services team member prepares to enter a patient room. Photo credit: Jonathan Hillenbrand, NorthShore University HealthSystem*

## ASPR TRACIE

**What other safety measures did you take to protect other patients and staff?**

## MF

When COVID first hit, our primary goal was to reduce the potential and likelihood for exposure. In the ED, for example, we worked with our telecommunications and ED/ED registration teams to upgrade telephones to allow for remote registration for individuals suspected of being COVID positive.

Our public safety department also played an integral role and were given appropriate PPE, fit-testing, and related training. Public safety was intimately involved in helping lock down our facilities, clearing hallways, and ensuring we maintained the proper six-feet of physical distance when moving patients from the ED to the units and back. The process was a little more labor intensive but this was our way of preventing inadvertent exposure to a COVID patient.

When it came to ergonomics, proning patients and moving them back and forth, especially when they were on ventilators, was extremely challenging. To minimize the challenges, all ICU rooms have ceiling lifts or lift equipment. We developed a protocol to use the lift sheets to help in proning the patients. The process still required at least four team members but using the lift and other ergonomically based strategies helped prevent injuries to our healthcare workers.

## ASPR TRACIE

**High-flow nasal cannula and other high flow oxygen applications skyrocketed during this time; did you have issues with oxygen?**

## MF

We replaced some back-up oxygen pumps to ensure we had sufficient pressure and volume but fortunately nothing worse than that. The biggest issue was understanding the difference when we conducted PPE risk assessments. We considered high flow cannulas to be an aerosol generating procedure, so we required the higher level of protection in those areas.

## ASPR TRACIE

**Did your teams get redeployed to any non-traditional roles?**

## MF

As we shifted to provide more COVID-specific care, one of our hospitals which is dedicated to orthopedic and spine care was nearly vacant. So we redeployed some environmental, transport, and facilities staff to support our more crowded hospital. The biggest area of opportunity for redeployed staff was in public safety and screening. We also trained staff on fit-testing for N95 respirators.

## ASPR TRACIE

**What lessons are you carrying with you for the next infectious disease emergency?**

## MF

Communication and transparency are key to our success. It's critical that operations and administration are aligned in our action plan to avoid workflow disruptions. At the very core of who we are as a system, it's imperative to have a multidisciplinary partnership working together.

I also look forward to improving and enhancing our novel virus response and mitigation protocols based on what we have learned. From a facilities and infrastructure standpoint, one critical ability is being able to flip areas back and forth more quickly in terms of pressure differentials. Instead of having to go into a room, open a ceiling and drill into duct work, we would like to have the ability to control this within our building automation system. We are currently exploring options for our EDs, so we could convert more rooms or areas to negative pressure quickly to help contain and protect other areas of the hospital.

Lastly, we will continue to evaluate access control. Our "new normal" will likely no longer include the degree of open access that existed pre-COVID. This is a positive move as we continue to strive to provide our patients and visitors with high quality care, safety, and security.