

Pandemic Emergency Preparedness Planning Overview



In order to meet the Department of Health and Human Services, Centers for Medicare & Medicaid Services (CMS) requirement for Emergency Preparedness, including “emerging infectious diseases”, M/E Engineering believes it will be very important for Healthcare Facilities to document the tremendous efforts they have made with respect to the operation and maintenance of their mechanical systems as part of their After Action Reporting (AAR), in light of the current global pandemic. In addition, proactive planning for the future, including lessons learned, should be included to enhance each facility’s unique requirements for “**Pandemic Emergency Preparedness Planning**”.

Planning should include ongoing efforts in managing the spread of SARS-CoV-2, the virus that causes COVID-19 disease in the months ahead, as well as **future epidemics that could have a real possibility of transmission through the air by various pathogens that may have higher aerosol potential than COVID-19**. Pathogens with higher aerosol potential would create a greater impact on HVAC systems that protect patients, residents and healthcare providers.

We have been very closely following infectious aerosols guidance from ASHRAE and ASHE in order to gain a strong understanding of the issues and potential impact of modifications to building operations to reduce airborne exposures for our clients. This insight will also help to inform best practices for the new norm when designing for building renovations and new construction in the future.

M/E Engineering’s staff has been certified by the American Society of Heating Refrigerating and Air Conditioning Engineers (ASHRAE), in Health Care Facility Design and are national members of The American Society for Health Care Engineering of the American Hospital Association (ASHE). We are dedicated to optimizing the health care physical environment.

ASHRAE’s statement on airborne transmission of SARS-CoV-2/COVID-19:
Transmission of SARS-CoV-2 through the air is sufficiently likely that airborne exposure to the virus should be controlled. Changes to building operations, including the operation of heating, ventilating, and air-conditioning systems, can reduce airborne exposures.



Emergency Preparedness Planning should include a detailed analysis of existing systems serving various areas within the healthcare facility to determine their effectiveness in reducing airborne transmission of infectious aerosols, as well as their ability to support the potential need for increased capacity - such as oxygen for added ventilators or dialysis, etc. Issues at critical areas within the facility would be identified and operational modification strategies be developed, including COVID-19 response lessons learned.

Inspection, Testing and Maintenance (ITM) deferral documentation and risk assessment analysis need to be completed for all MEP systems in order to identify potential waiver requests.

In addition to operational modifications, short term and long term planning for system upgrades would be considered in order to improve the facility's ability to react to future pandemics. Set aside areas for PPE decontamination using UV Light or Hydrogen Peroxide Vaporization (HPV) should be considered. Resiliency, reliability and redundancy would also be evaluated.

Areas of the facility available to be reconfigured to serve infected, or potentially infected patients/residents, would be identified based on compatibility with HVAC systems and capacity of services etc. Areas of particular concern include:

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| • Emergency Department | • Inpatient Beds | • Skilled Nursing |
| • Intensive Care Units | • Imaging Department | • Dental Care |
| • Infectious Isolation Rooms | • Surgery Suite | • Decontamination |

Considerations for Pandemic Emergency Preparedness Planning include:

Minimizing Airborne Transmission

- Air change rates and ventilation
- Pressure relationships
- Air Balancing
- Exhaust air discharge configuration
- Return air recirculation
- Air handling zoning
- 100% outside air supply (air side economizer operation)
- Filtration
- In-Room Airflow distribution
- Ante-Rooms

Heating and cooling capacity

- Humidification
- UVC Lights
- Bi-Polar Ionization

Temporary reconfiguration, flexibility/adaptability

- HVAC
- Medical gases
- Plumbing
- Nurse Call
- Re-Commissioning restoration to normal operation

Medical Gases

- Source capacity
- Source supply
- Distribution piping capacity

Resiliency

- Reliability
- Redundancy
- Emergency Power

CFD Modeling

M/E Engineering's in-house CFD capabilities have allowed our staff to analyze specific issues for many applications, providing insight to our design process when anticipating and reacting to the complex environment, allowing us to engineer successful project results.

We are actively involved in modeling of COVID-19 infectious aerosols related to exhaust air streams and their impact on air intakes as well as activities on rooftops. The results have allowed our clients to understand current risks associated with existing systems as well as determine modifications necessary in order to mitigate risk in the future.

The method M/E has derived for this application calculates the concentration of virus droplets at the point of each exhaust and models the dilution as the exhaust air discharges from the building.

M/E Engineering has utilized CFD Modeling on Healthcare projects for the following applications:

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| • Isolation Room/Lab fume exhaust discharge | • Outside Air Intake contamination | • Operating Room air distribution |
| • Building exhaust Wind Wake Analysis | • Ventilation Effectiveness | • Contaminant Control |

Emergency Preparedness Planning Process

The emergency preparedness planning process for a pandemic response will vary with the type of facility and the level of detail that exists with any current plan, however at a minimum we believe that updating current plans with additional detail and lessons learned from the COVID-19 response is appropriate.

Planning may include adaptability of an existing facility or locations within a facility to identify infected patient/resident care areas, as well as identifying areas that are off limits due to HVAC, capacity or risk to healthcare providers or other patients/residents.

Major renovations or new construction should include an emergency preparedness planning process for a pandemic response so that the facility can properly plan for appropriate HVAC system features and medical gas capacity, infectious isolation ante-rooms, and decontamination rooms etc.

- **Pre-Planning** - M/E Engineering, PC will work with the facility staff and emergency preparedness planning team early in the process in order to establish the goals of the facility and develop a list of the team's priorities which typically would include identifying current and future needs and documentation requirements.
- **Information Gathering** - Facility plans, department layouts as well as the MEP systems serving those critical spaces, will be identified and documented.
- **Strategic Analysis** - Pandemic threats such as airborne transmission of aerosolized viruses and the resulting treatment of patients will be studied with respect to the MEP infrastructure. An MEP After Action Report (AAR) and evaluation of temporary measures made along with lessons learned from the COVID-19 response will be evaluated and documented. Demobilization and re-commissioning will need to be addressed for returning systems to their original design intent or an improved condition.
- **Response Adaptability** - Detailed documentation of existing MEP system conditions and their flexibility to address a pandemic threat will be developed, along with recommendations for changes to the operation of existing mechanical systems to improve their effectiveness in addressing future responses.
- **Goals** - M/E Engineering will develop a list of short-term and long-term infrastructure improvements and upgrades required to address the emergency preparedness planning team's goals. Priorities and schedule will be established in order to provide a clear and phased approach to developing a consensus emergency preparedness plan that is customized for your facility.

