What's changed: replaced PPE references with link to PPE Guidebook; added link to American Society of Healthcare Engineers (ASHE) resources on negative pressure rooms; updated references to HVAC changes to be managed by Facilities Leadership; added link to Safe Transport of COVID-19 Patients and PUIs; updated Figure 1.0 to clearer image

Based on experience involving the largest cohort of COVID-19 patients:
- about 40% of patients with COVID-19 may have mild disease, where treatment is mostly symptomatic and does not require inpatient care;
- about 40% of patients have moderate disease that may require inpatient care;
- 15% of patients will have severe disease that requires oxygen therapy or other inpatient interventions;
- and about 5% have critical disease that requires mechanical ventilation.

Therefore, clustering patients into a defined geographic location in the facility will improve efficiency and effectiveness of the three key aspects of responding to a pandemic; space, staff and "stuff" (supplies, equipment, etc.).

Key Concepts:
- Isolate symptomatic patients as soon as possible. Set up separate, well-ventilated triage areas, place patients with suspected or confirmed COVID-19 in private rooms with door closed and private bathroom (as possible), prioritize airborne infection isolation rooms (AIIRs) for patients undergoing aerosol-generating procedures.
- Protect healthcare personnel. Emphasize hand hygiene, install barriers to limit contact with patients at triage, cohort COVID-19 patients, limit the numbers of staff providing care for those under isolation precautions -- see also PPE Guidebook.

Establish COVID-19 treatment areas within health facilities (rooms/ward/unit) based on needed response to surge in number of patients with COVID-19.
- COVID-19 and PUI treatment areas should be designed to allow uniform implementation of all required infection prevention and control precautions and work practices.
• COVID-19 treatment areas should be designed to deliver life-saving oxygen therapy. Most patients hospitalized with severe disease will need oxygen, and a smaller proportion will require mechanical ventilation. See Figure 1 for examples of respiratory support needed for patients with COVID-19.

**Designate inpatient units for cohorting care of COVID-19 applying the following elements:**

• Apply decision flow guide for placing patients needing admission for clinical care.

• Assess volume and frequency of PUIs and/or confirmed COVID-19 requiring inpatient care. If this is approaching or at surge levels identify inpatient unit(s) for cohorting care of these patients, e.g. an ICU and possibly a med-surg ward. See examples of designated unit design in Figures 2 & 3.

• Most inpatient units will have a limited number of AIIRs. Give priority for initial placement of PUIs who the care team anticipates will need continuous or frequent AGPs, e.g. nebulizer treatments, high flow nasal cannula delivery of oxygen, non-invasive ventilation (e.g. BiPap) or bedside tracheostomy.

  o If incident command determines a cohort unit is needed, involve facilities manager in determining strategies for the heating, ventilation and air conditioning (HVAC) system to enhance exchange and removal of exhaust air from the designated unit. Refer to the American Society of Healthcare Engineers (ASHE) COVID-19 resources pages for examples of temporary strategies for creating additional negative pressure rooms/spaces.

Here are examples of scalable changes for the HVAC system that the facilities manager needs to oversee and coordinate:

• Normal mode: place PUI/COVID-19 patient in airborne infection isolation room – priority would be if patient is anticipated to need aerosol generating procedure(s) [AGP]

• Small scale surge capacity mode: create additional, dedicated AIIRs or temporary patient observation area with portable HEPA devices.

• Large scale surge capacity mode: establish dedicated patient unit – if available activate ‘negative pressure mode’, meaning 100% outdoor air and dedicated exhaust. Note, this HVAC design would need to be in place or the Facilities management and ministry leaders will need to assess feasibility if not part of existing HVAC system.

• Avoid cohorting PUIs and COVID-19 patients together as many PUIs could be ruled out if they test negative for SARS-CoV-2.

• Limit transport of PUIs or COVID-19 from the room in which they are being isolated to essential diagnostic or therapeutic care as determined by the care team. See also Safe Transport of COVID-19 Patients and PUIs.

• Avoid designating a room or area for AGPs as this will require transfers and movement of patients in and out of their inpatient room. Transfers increase risk to the patient of the intubation tube being dislodged or further spreading the virus in the unit.
**Figure 1. Respiratory Support for COVID-19**

General schema for respiratory support in patients with COVID-19:

**Low flow nasal cannula**
- Typically set at 1-6 liters/minute.

**High flow nasal cannula**
- Titrate FiO2 based on patient’s saturation. If FiO2 requirement escalating (e.g. over ~80%) consider awake pronation or CPAP trial.

**CPAP (or BiPAP with low driving pressure)**
- Titrate CPAP up as tolerated (in more severe hypoxemia might target ~15 cm).
- Helmet interface likely ideal, if available.
- Viral filter.

**Awake pronation plus (High Flow Nasal Cannula or CPAP/BiPAP)**
- If tolerated, awake patient may lie in a prone position or rotate positions.
- Limited to cooperative patients.

**Invasive mechanical ventilation**
- Target tidal volumes of ~6 cc/kg.
- Permissive hypercapnia may be useful to allow for lung-protective settings.
- May use conventional lung-protective ventilation strategies or APRV.

**Prone positioning**
- Consider for severe hypoxemia (e.g. PaO2/FiO2 <= 150) that doesn’t respond to ~12-24 hours of invasive ventilation with high mean airway pressure (e.g. high PEEP or APRV).

**VV-ECMO**
- Indications remain unclear.
- Early discussion with ECMO center or team may be advisable.

The optimal strategy for respiratory support in COVID-19 remains unknown. Patients with more complex respiratory disease (e.g. COPD plus COVID-19) might benefit from BiPAP. Choice of CPAP vs. HFNC may vary depending to resources and patient preference. COVID appears to cause progressive micro-atelectasis, which responds well to CPAP.
Figure 2. Example of Cohorted, Isolation Intensive Care Unit

Pathway for entry of personnel into a cohort isolation unit, ICU

Exit from cohort isolation unit
Figure 3. Example of Cohorted Isolation Unit, Med-Surg location

References:

