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# The importance of a centralized line service during the COVID-19 pandemic



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As vascular surgeons in New York City, we are currently in the epicenter of the COVID-19 crisis in the United States. As of April 24, 2020, there are 869,172 COVID-19 cases in the United States, of which >600,000 are in New York City. Mount Sinai Health System has one of the largest consortiums of COVID-19 patients in New York City. To meet the demand of the increasing numbers of hospitalized patients with COVID-19, many health care providers have been placed in roles outside of their immediate level of training and are often treating a large cohort of patients. In part, this has resulted in a sharp increase in the rate of central line complications, resulting in urgent vascular surgery consultation and intervention.

The cause of complications after central line insertion is likely to be multifactorial. Ultrasound-guided access has been shown to decrease central line complications.<sup>1,2</sup> Emergent line insertion and placement by an inexperienced practitioner also increase central line complications.<sup>3</sup> Intensive care units are at full capacity with critically ill COVID-19 patients. These errors after central line insertions will also result in increased exposure of frontline health care workers to the virus from the workup, imaging, and intervention needed to manage these complications.

In response to this, we have created line service teams to assist with central and arterial line placements throughout the Mount Sinai Health system. However, the COVID-19 pandemic brings important challenges and considerations to central line placements that are patient and institution specific and will alter treatment algorithms. We discuss some of these considerations.

## STRUCTURE OF LINE SERVICE

The composition of the line service team should be tailored to the specific institution according to availability of staff and volume of access consultations. In our health system, our line service teams consist of multiple vascular surgeons, interventional radiologists, and interventional cardiologists who have extensive experience in ultrasound-guided vascular access. Although composition of the team varies between hospital, each shift generally has at least two attending physicians and one or two ancillary staff. Each shift is 8 to 12 hours, and the line service is available at least 5 days a week. There are approximately 5 to 10 requests for line insertions per day per hospital. To date, all cases have been performed at bedside, but a negative pressure room in a fluoroscopy suite is available for difficult line insertions. The attending physician performs the procedure and the ancillary staff is in the patient's room to assist with line placement. Under ultrasound guidance, the central line is inserted in the usual fashion and secured with silk suture. Each port is instilled with heparinized saline (5000 units/mL), and a biopatch and sterile dressing are applied.

## SELECTION OF PATIENTS

Although data are limited, there appears to be an alarmingly high mortality rate in critically ill patients with COVID-19 infection.<sup>4</sup> Thus, it is important to consider the prognosis of a patient before placing a central line. Futile line insertions will subject the staff to unnecessary viral exposure as well as misallocation of limited medical supplies and personal protective equipment. In particular, a significant portion of patients with severe COVID-19 disease will develop renal failure requiring hemodialysis, and the prognosis appears to be poor.<sup>5</sup> This is limiting available hemodialysis machines and exposing the dialysis staff to COVID-19. Thus, it is particularly important in these patients needing hemodialysis access that a goals of care discussion be held before line insertion whenever possible. In nonintubated patients who are hemodynamically stable, preference can be given to placement of midline catheters or large-bore peripheral intravenous access.

## AVAILABLE HOSPITAL RESOURCES

The line team has one disposable premade bag for each central line that contains all equipment needed, including personal protective equipment, ultrasound probe cover, and central line kit. The ultrasound

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machines are meticulously cleaned with an alcohol-based solution after every use. We realize that some institutions may have limited access to ultrasound machines, in which case anatomic landmarks can be used. This will also avoid transporting and cleaning an ultrasound machine for each procedure. In addition, portable chest radiographs may be difficult to obtain in a timely fashion during the COVID-19 crisis. An advantage of femoral vein access is that no postprocedure chest radiograph is needed. However, for straightforward internal jugular vein central lines, postprocedure chest radiographs are not routinely ordered to avoid potential exposure of radiology staff to the virus.

### LOCATION OF CENTRAL LINE

The internal jugular or subclavian vein is generally used for access because of potentially lower rates of infection.<sup>6,7</sup> However, in patients who are at high risk for aerosolizing the infection (nonintubated patients on high-flow nasal cannula or bilevel positive airway pressure) or patients who are unable to lie flat, the femoral vein is preferentially chosen for line placement. The majority of these high-risk for aerosolization procedures have been in nonintubated patients with COVID-19 and renal failure requiring hemodialysis access. In addition, a significant portion of patients with severe COVID-19 may require prone positioning to improve oxygenation and ventilation. In these instances, femoral lines will be much more difficult to access, and preference can be given to internal jugular vein access. Some providers have routinely placed triple-lumen catheters in the left internal jugular or subclavian vein, so the right side can be used for hemodialysis catheters if needed. An alternative is that both the triple-lumen catheter and dialysis catheter can be placed on the right side, with spacing of the access sites in the neck. We have noted that many of our lines have thrombosed shortly after line insertion when instilled with saline or low-dose heparin. Thus, we have begun to instill each port of the central line with heparinized saline (5000 units/mL).

### FINAL THOUGHTS

The COVID-19 pandemic has resulted in a large volume of central line insertions and an urgent need for an experienced team to facilitate line placement. Vascular surgeons and interventionalists can serve an urgent and important role by creating a central venous access team and tailoring it to the needs of their institution.

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