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## Creation of a dedicated line service in the New Jersey epicenter of COVID-19



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As part of the New York Metropolitan region, New Jersey follows New York, becoming the second largest epicenter of SARS-coronavirus 2 (COVID-19) infection in the United States during this pandemic. Hackensack Meridian Health, the largest health care system in New Jersey, continues to seek innovative and practical ways to battle this pandemic. On March 15, we issued a policy to temporarily postpone nonurgent and nonemergency hospital and campus-based operations and procedures for 2 weeks in anticipation of an expected surge of patients. This policy was extended as recommended by the Centers for Medicare and Medicaid Services, moving to tier 3 surgery and procedures only as outlined in the guidelines. We also followed direction from our governor's executive order to suspend elective procedures that was announced on March 23, 2020, and remained in effect until May 26, 2020.

One of the most challenging aspects of planning for this large increase in the volume of hospitalized patients with COVID-19 is ensuring an appropriate staffing strategy to safely care for this complex disease. A significant number of patients hospitalized for COVID-19 in our region have developed severe symptoms, resulting in respiratory and multiorgan failure necessitating an intensive care unit (ICU) level of care. Typically, central venous access and arterial catheters are required for medication delivery and blood pressure monitoring in these critically ill patients. Given the strain on our intensivists and the sheer volume of patients presenting with critical illness, our intensive care providers quickly became stretched to capacity. As our institution quickly needed to reconfigure the number of existing ICU beds from 60 to a peak of 250, it became clear that our ICU colleagues needed help for coverage. In addition, our overall hospital

capacity needed to increase to treat the >600 COVID-19 patients hospitalized during our peak.

By temporarily allocating a significant portion of our vascular surgery service to a line service supporting our ICU colleagues, it helps to ensure that our frontline team members are able to respond to the current and projected number of COVID-19 patients who have come to our hospital seeking care.

On April 7, the Division of Vascular Surgery at Hackensack University Medical Center announced the services of the vascular line service protocol through electronic and verbal communication to the department chairs in medicine, surgery, pediatrics, and emergency medicine. This established our responsibility to provide central venous, arterial line, and dialysis catheter access on all patients with COVID-19 or with suspected infection in whom central venous or continuous blood gas and blood pressure monitoring is deemed clinically necessary from 7 AM to 7 PM daily. Lines needed in the evening hours were staffed by the surgical critical care team with vascular surgery backup as needed; however, encouragement for daytime placement of lines if clinically possible was stressed. In consultation with the critical care teams, it was determined that our coverage time frame would incur the majority of line requests because existing line changes and dialysis catheter placements were triaged to the daytime hours if feasible.

At the height of the pandemic, a daily rotation of at least two dedicated in-house board-certified vascular surgeons covered lines, while vascular surgery emergencies were handled by the on-call vascular attending to ensure adequate coverage. Consultations for lines were called into a direct hospital cell phone carried by one of the providers, thereby limiting any delays in communication. Our division includes six full-time vascular surgery attendings, all of whom participated in the line service initiative. To stagger exposure to COVID-19 and to ensure adequate reserve, on average one surgeon a week would be free of hospital clinical duty during the peak of the pandemic. The physicians on line duty were also on the vascular surgery call schedule. Our fellow assisted part time with coverage; however, the surgical residents did not participate in this project so as to limit their exposure. In the event that multiple vascular surgeons became positive or had to be quarantined, a contingency plan to recruit general surgeons to the line service was considered.

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The rationale for the daytime vascular line service is several fold. Vascular surgery attendings possess the skill and competence for safe and rapid catheter placement, thus limiting the amount of time needed for placement and reducing potential access-related complications. This also allows the ICU team to focus on daily rounds and to direct patient care, relieving them of the burden of line placement in patients distributed across multiple units. Given the sole focus of the line service, the sheer volume of line requests can be adequately managed. In addition, by limiting the number of providers providing access, we have been able to conserve scarce supplies of personal protective equipment. Our method for conserving personal protective equipment involves consideration for both protecting the physician and ensuring enough equipment for our division. Whenever a bedside or invasive procedure was performed on a patient with COVID-19 or a patient suspected of having COVID-19, an N95 mask was worn with a surgical mask placed over the N95 mask. The surgical mask was thrown away after each use, but the N95 was reused and kept in

a surgeon's individual brown paper bag for up to a week at a time. A reusable face shield was also conserved and wiped with an alcohol-based solution after each patient encounter. We were fortunate to have access to a dedicated COVID-19 line service ultrasound, which was cleaned using alcohol wipes after each use.

The effectiveness of social distancing and stay-at-home recommendations allowed a long-welcomed flattening of the curve and reduction in COVID-19 hospitalizations in our region. At the conclusion of the line service, a total of 398 central venous catheter and 249 arterial lines have been placed by the vascular line service. Thankfully, none of us turned COVID positive. There were no instances of vascular complications, and we have been able to alleviate some of the increased burden felt by our colleagues. Our experience has also allowed us to be part of the front line and to share in the spirit and hope of combating this pandemic.

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