Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Elsevier hereby grants permission to make all its COVID-19-related research that is available on the COVID-19 resource centre - including this research content - immediately available in PubMed Central and other publicly funded repositories, such as the WHO COVID database with rights for unrestricted research re-use and analyses in any form or by any means with acknowledgement of the original source. These permissions are granted for free by Elsevier for as long as the COVID-19 resource centre remains active.
ABSTRACT

Objective: The COVID-19 pandemic has had major implications for the United States health care system. This survey study sought to identify practice changes, to understand current personal protective equipment (PPE) use, and to determine how caring for patients with COVID-19 differs for vascular surgeons practicing in states with high COVID-19 case numbers vs in states with low case numbers.

Methods: A 14-question online survey regarding the effect of the COVID-19 pandemic on vascular surgeons’ current practice was sent to 365 vascular surgeons across the country through REDCap from April 14 to April 21, 2020, with responses closed on April 23, 2020. The survey response was analyzed with descriptive statistics. Further analyses were performed to evaluate whether responses from states with the highest number of COVID-19 cases (New York, New Jersey, Massachusetts, Pennsylvania, and California) differed from those with lower case numbers (all other states).

Results: A total of 121 vascular surgeons responded (30.6%) to the survey. All high-volume states were represented. The majority of vascular surgeons are using PPE. The majority of respondents worked in an academic setting (81.5%) and were performing only urgent and emergent cases (80.5%) during preparation for the surge. This did not differ between states with high and low COVID-19 case volumes ($P = .285$). States with high case volume were less likely to perform a lower extremity intervention for critical limb ischemia (60.8% vs 77.5%; $P = .046$), but otherwise case types did not differ. Most attending vascular surgeons worked with residents (90.8%) and limited their exposure to procedures on suspected or confirmed COVID-19 cases (56.0%). Thirty-eight percent of attending vascular surgeons have been redeployed within the hospital to a vascular access service or other service outside of vascular surgery. This was more frequent in states with high case volume compared with low case volume ($P = .039$). The majority of vascular surgeons are using PPE (71.4%) and N95 masks (86.4%), and 21% of vascular surgeons think that they do not have adequate PPE to perform their clinical duties.

Conclusions: The initial response to the COVID-19 pandemic has resulted in reduced elective cases, with primarily only urgent and emergent cases being performed. A minority of vascular surgeons have been redeployed outside of their specialty; however, this is more common among states with high case numbers. Adequate PPE remains an issue for almost a quarter of vascular surgeons who responded to this survey.

Keywords: COVID-19; Vascular surgery and COVID-19; COVID-19 and vascular surgeon
rationing and reuse of N95 respirators and surgical masks has become necessary in many hospitals.\textsuperscript{14,15}

Vascular surgical care is considered one of the three necessary/urgent hospital surgical services in conjunction with cardiothoracic surgery and trauma surgery. Hence, the way in which vascular surgeons are redeployed and physically protected and procedures are triaged during this pandemic is unique. The goal of this project was to identify the current vascular surgery practice changes in response to the pandemic, to understand current PPE use, and to understand how caring for patients with COVID-19 differs for vascular surgeons practicing in states with a high volume of COVID-19 patients from those with low volumes.

METHODS
An anonymous 14-question survey was sent to 365 vascular surgeons around the United States using REDCap Survey software (REDCap, Nashville, Tenn). The survey was distributed from April 14 to April 21, 2020, and all responses were received by April 23, 2020. Survey respondents were asked to identify their state of practice; however, to maintain anonymity, no further practice site questions were asked. An effort was made to reach vascular surgeons in all geographic regions of the country. The 365 vascular surgeons were compiled from various resources from the authors of the study. To make the survey more representative, e-mails from under-represented regions were obtained from the Society for Vascular Surgery website. Surgeons were asked to respond to the survey once. The survey questions and format are illustrated in Fig 1. Dedicated line service referred to a vascular access service or a service with the role of placing invasive lines, such as central or arterial lines, in critically ill patients.

Data were analyzed using descriptive statistics, and comparisons across geographic regions were made. To evaluate whether states with the highest number of COVID-19 cases (New York, New Jersey, Massachusetts, Pennsylvania, and California [as of April 23, 2020]) differed from those with lower case numbers (all other states), further analysis was done, dichotomizing states into high and low volumes of COVID-19 cases.\textsuperscript{16} Standard statistical analysis was performed comparing the two groups using Fisher exact test for categorical variables. Missing data were <2\% for all responses. Analyses were performed using Stata 15.1 (StataCorp LLC, College Station, Tex); all tests were two sided, and an $z$ level of .05 was used as the cutoff for statistical significance. The Institutional Review Board at Massachusetts General Hospital deemed this study exempt per their quality improvement project standards.

RESULTS
Of the 365 physicians contacted to complete this survey, 121 replied for a 30.6\% response rate. Thirty-three states including all high-volume COVID-19 states were represented (Fig 2). The majority of respondents were from California (13.2\%), Massachusetts (9.9\%), and New York (11.6\%), but these states still represented <50\% of respondents (n = 51 [42.1\%]). Seventy respondents (57.9\%) were from low-volume COVID-19 states.

The majority of physicians who answered this survey practice in an academic setting (81.5\%), followed by a large community practice (14.3\%). Small community practices, only 4.2\% of respondents, were not well represented in this survey (Fig 3).

Practice changes have been instituted, with 80.5\% of vascular surgeon respondents limiting their practice to urgent and emergent cases (Fig 4). Stricter practice changes are seen in some hospitals where they are performing only emergent cases (15.3\%), whereas only a minority of surgeons are still performing elective cases (4.2\%). Overall, most vascular surgeon respondents continue to perform operations for symptomatic and ruptured abdominal aortic aneurysms (87.4\%), aortic dissection with malperfusion (79.8\%), acute limb ischemia (72.3\%), amputation for wet gangrene or ascending cellulitis (93.3\%), acute mesenteric ischemia (90.8\%), symptomatic carotid artery disease (84.9\%), and revision/removal of nonfunctional or infected dialysis access (80.7\%). The scope of cases performed was overall similar between states with high and low volumes of COVID-19 patients, except states with high case volume were less likely to perform a lower extremity intervention for critical limb ischemia (60.8\% vs 77.5\%; $P = .046$; Table).

Currently, most vascular surgeon respondents reported not testing asymptomatic patients for COVID-19 before operations (61.7\%). For those patients being tested, the turnaround for a result is <24 hours for the majority of centers (73.9\%); however, nearly a quarter of vascular surgeons are still waiting >24 hours for test results. Most vascular surgeon respondents work with residents (90.8\%), and the majority of these surgeons are operating with residents in a limited capacity on COVID-19-positive COVID-19 patients.
patients. There was a difference between states with high and low volumes of cases in how residents are functioning in the operating room (operating at full capacity [23.9% vs 36.5%], operating at limited capacity [69.6% vs 46.0%], not operating with residents [6.5% vs 17.5%; P = .040].

Regarding the care of COVID-19 patients, most vascular surgeons reported intubating in the operating room for COVID-19 Survey

1. What state do you practice in?
   1. Academic
   2. Large community hospital
   3. Small community hospital

2. What type of cases are you currently doing?
   1. All cases - elective, urgent, emergent
   2. Urgent and Emergent cases only
   3. Emergent cases only

3. What type of operations are you currently performing?
   1. AAA: asymptomatic
   2. AAA: symptomatic / ruptured
   3. Aortic dissection with malperfusion
   4. LE bypass of endovascular intervention for claudication
   5. LE bypass or endovascular intervention for CLI
   6. LE intervention for acute limb ischemia
   7. Amputation for non-acute presentation
   8. Amputation for wet gangrene, ascending cellulitis
   9. Intervention for chronic mesenteric ischemia
   10. Intervention for acute mesenteric ischemia
   11. Asymptomatic carotid revascularization
   12. Symptomatic carotid revascularization
   13. AV fistula and graft placement for future dialysis
   14. Dialysis access creation for acute renal failure
   15. Removal of infected dialysis access
   16. Revision thrombosed or nonfunctional dialysis access
   17. First rib resection for thoracic outlet syndrome
   18. IVC filter placement
   19. Varicose veins: GSV ablations
   20. Procedure for venous ulcerations
   21. IVC filter removal
   22. Anterior spine exposure

5. Are you testing asymptomatic patients for COVID-19 prior to the OR?
   1. Yes
   2. No

6. How long does it take to obtain the results of the COVID-19 test prior to going to the OR?
   1. <1 hour
   2. 1-2 hours
   3. 2-24 hours
   4. >24 hours

7. Are you operating with residents in cases of suspected or confirmed COVID-19 patients?
   1. Yes, full capacity
   2. Yes, limited capacity
   3. No
   4. N/A, I don’t work with residents

8. What is your preoperative intubation protocol for suspected or confirmed patients with COVID-19?
   1. Intubate in the OR
   2. Intubate in a separate non-negative pressure room and then transport to the OR
   3. Intubate in a negative pressure room and then transport to the OR

9. When operating on patients with COVID-19 (confirmed or suspected), what type of mask are you wearing?
   1. Surgical mask
   2. N95 Respirator

10. How long after intubation are you allowed to enter the OR?
    1. During intubation and immediately after
    2. Wait ≤ 30 minutes to enter the room after intubation
    3. Wait > 30 minutes to enter the room after intubation

11. Are you being redeployed in other ways outside of your usual practice?
    1. No
    2. Yes, dedicated line service
    3. Yes, ICU, ED or other service outside vascular surgery

12. Are you reusing PPE for multiple patients?
    1. Yes
    2. No

13. Are you reusing N95 masks?
    1. Yes
    2. No

14. Do you feel you have adequate PPE to effectively perform your clinical duties?
    1. Yes
    2. No

Fig 1. COVID-19 survey listed in its entirety. AAA, Abdominal aortic aneurysm; AV, arteriovenous; CLI, critical limb ischemia; ED, emergency department; GSV, great saphenous vein; ICU, intensive care unit; IVC, inferior vena cava; LE, lower extremity; N/A, not applicable; OR, operating room; PPE, personal protective equipment.
cases (73.9%) and are wearing N95 respirators during the operation (92.2%). Most vascular surgeons reported waiting up to 30 minutes before entering the operating room after intubation (64.1%). In addition, a minority of vascular surgeons are being redeployed to a vascular access service (23.7%) or another service outside vascular surgery (18.6%; Fig 5). Vascular surgeons in states with high case volumes were more likely to be redeployed to a vascular

Fig 2. Response to the state in which the vascular surgeon practices.
Respondents from states with high case volumes showed that vascular surgeons are being asked to use their expertise in vascular access as well as their comprehensive health care knowledge to redeploy in other areas of patient management needed during a health care crisis. This highlights the important nature of the broad skill set that vascular surgeons can apply to patient management and their inherent necessity in the health care system during times of crisis. Vascular practice, particularly in states with high case volumes, has significantly changed, with the majority of centers performing only urgent and emergent cases. Vascular surgeons should be ready to redeploy during health care crises, and it may be prudent to have such protocols for redeployment in place for future health care emergencies.

Twenty-one percent of vascular surgeons do not think that they have adequate PPE. Whereas this sentiment is certainly not unique to vascular surgeons or to the United States, it underscores a major shortcoming in the preparedness of the world for a global health care catastrophe. Given the relative rarity of vascular surgeons and the breadth of patient emergencies in which vascular surgeons treat, it is imperative that vascular surgeons be adequately protected. This will enable continued delivery of the essential health care services that vascular surgeons are uniquely qualified to provide. In addition, most academic vascular surgeons who responded to the survey are modifying their practice to limit trainee exposure. This practice may be partially driven by PPE shortages but probably also reflects a desire to protect our trainees from unnecessarily exposure. The majority of vascular surgeon respondents were also being asked to reuse PPE, a common practice throughout the United States during the pandemic. It is unclear how many institutions have instituted resterilization protocols. Resources should be directed at improving access to PPE for all health care providers to ensure that those providing essential duties are not at an increased risk of contracting COVID-19.

Delay in cases seems common, whether it is occurring while waiting for a COVID-19 rule-out test or waiting to enter the operating room until a sufficient amount of time has passed after intubation of patients who are COVID-19 positive or suspected cases. The impact this has on outcomes is currently unknown, but given the many time-sensitive interventions that vascular surgeons provide, this may be a problem. Even in negative pressure rooms, it takes 30 minutes for 99.99% of the aerosolized particles to be removed; waiting for these rooms to clear of aerosolized particles can cause fatal delays in treating ruptured aneurysms or cause undue ischemia time in cases in which tourniquets are applied for extremity hemorrhage. It was outside the scope of this project to determine the impact this operative delay may have on patient outcomes.
An even greater impact than the delay in cases is the transition of cases from all elective, urgent, and emergent operations to primarily only vascular urgencies and emergencies that are lifesaving and limb saving. These include symptomatic or ruptured abdominal aortic aneurysm, type B dissection with malperfusion, symptomatic carotid artery disease, and revision or removal of nonfunctional or infected dialysis access. It is likely that the centers not performing these cases are transferring patients with these diagnoses to higher levels of care as opposed to opting for

| Survey item | Low-volume states (n = 70) | High-volume states (n = 51) | P value |
|-------------|----------------------------|-----------------------------|---------|
| Academic    | 55 (79.7)                  | 42 (84.0)                   | .399    |
| Large community hospital | 12 (17.4) | 5 (10) | .999 |
| Small community hospital | 2 (2.9) | 3 (6.0) | .999 |
| Case type   |                            |                             |         |
| All cases   | 3 (4.4)                    | 2 (4.0)                     | .999    |
| Urgent and emergent | 58 (85.3) | 37 (74.0) | .999 |
| Emergent only | 7 (10.3)     | 11 (22)                    | .999    |
| Operations for |                         |                             |         |
| Asymptomatic AAA | 18 (23.4) | 15 (29.4) | .619 |
| Symptomatic or ruptured AAA | 60 (84.5) | 44 (86.3) | .786 |
| Aortic dissection for malperfusion | 58 (81.7) | 37 (72.6) | .230 |
| Claudication | 1 (1.4)                    | 4 (7.8)                     | .160    |
| CLI         | 55 (77.5)                  | 31 (60.8)                   | .046    |
| ALI         | 65 (91.6)                  | 48 (94.1)                   | .592    |
| Amputation (nonacute disease) | 13 (18.3) | 5 (9.8) | .300 |
| Amputation for wet gangrene or ascending cellulitis | 65 (91.6) | 46 (90.2) | >.999 |
| CMI         | 15 (21.1)                  | 12 (23.5)                   | .753    |
| AMI         | 65 (91.6)                  | 43 (84.3)                   | .216    |
| Asymptomatic carotid disease | 4 (5.6) | 2 (3.9) | >.999 |
| Symptomatic carotid disease | 62 (87.3) | 39 (76.5) | .147 |
| Dialysis access (future dialysis) | 19 (26.8) | 11 (21.6) | .511 |
| Dialysis access (acute renal failure) | 20 (28.2) | 18 (35.3) | .402 |
| Infected dialysis access | 53 (74.7) | 43 (84.3) | .198 |
| Thrombosed or nonfunctional dialysis access | 45 (63.4) | 33 (64.7) | .880 |
| Thoracic outlet syndrome | 6 (8.5) | 1 (2.0) | .257 |
| Varicose veins | 0 (0)         | 3 (5.9)         | .071    |
| Venous ulceration | 5 (7.0) | 6 (11.8) | .523 |
| IVC filter placement | 32 (45.1) | 27 (52.9) | .397 |
| IVC filter removal | 5 (7.0) | 4 (7.8) | >.999 |
| Anterior spine exposure | 2 (2.8) | 3 (5.9) | .400 |
| Testing asymptomatic patients | 27 (38.6) | 19 (38.0) | >.999 |
| Redeployment |                         |                             |         |
| No          | 52 (73.2)                  | 26 (51.0)                   | .014    |
| Yes—line service | 11 (15.5) | 12 (33.3) | .257 |
| Yes—ICU, ED, or other non-vascular service | 9 (12.7) | 13 (25.5) | .999 |
| PPE reuse   | 50 (72.5)                  | 35 (70.0)                   | .769    |
| N95 reuse   | 59 (86.8)                  | 43 (86.0)                   | >.999   |
| Adequate PPE | 55 (79.7)                  | 39 (78.0)                   | .821    |

AAA, Abdominal aortic aneurysm; ALI, acute limb ischemia; AMI, acute mesenteric ischemia; CLI, critical limb ischemia; CMI, chronic mesenteric ischemia; ED, emergency department; ICU, intensive care unit; IVC, inferior vena cava; PPE, personal protective equipment.

Values are reported as number (%).
nonoperative management. The fact that <5% of respondents are still performing elective cases shows the far-reaching implications of the pandemic in vascular surgery daily practice as well and adherence to protocols recommended by the Surgeon General and vascular surgery-specific recommendations. Furthermore, the downstream effects of not treating vascular disease that is considered elective has yet to be determined. It will be important to understand how the health of the population of vascular surgery patients is affected by this shift toward urgent and emergent cases.

At our large tertiary institution, which is both a high-volume vascular center and within a high-volume COVID-19 state, we have altered practice to manage our vascular services optimally. In our initial response (early March 2020), vascular trainees were not involved in COVID-19 cases, and attending surgeons saw these patients alone (both to protect our trainees and to limit use of PPE). All elective operations and clinics were canceled, and patients were tracked on a master list managed by the division chief to ensure appropriate follow-up. Patients admitted to the hospital were not allowed to have visitors. The division created a combined list of surgical cases, and each attending surgeon determined individually whether the patient could be rescheduled or required an urgent procedure.

As the pandemic evolved, so did the response from our division; by the end of March into mid-April, the vascular service had been restructured such that teams of two attending surgeons were covering call week to week and served as each other’s backup. The rationale was to limit exposure, and in the event that one team contracted COVID-19, a backup team would be readily available. The team that was “on call” for the week also would see any clinic patients of their partners who were deemed to need an in-patient visit. Once our hospital established an appropriate supply of PPE, our vascular trainees were involved in cases and patient care once again. During the last month, our group has evolved further; hospital-wide initiatives included redeployment to a vascular access service where an attending surgeon oversees residents who place hemodialysis catheters, central venous lines, arterial lines, and orogastric and nasogastric tubes in intensive care unit patients (COVID-19 positive and negative). At this point, it is a voluntary service, and our vascular attending surgeons and residents have been heavily involved in providing this care, given their expertise. Virtual visits for clinic patients have been established as well, and the vascular division chief co-ordinated weekly education on how to perform and bill correctly for these visits. We have virtually re-established grand rounds and morbidity and mortality conferences for our trainees as well as weekly case conference and vascular laboratory education. The vascular laboratory continues to perform urgent, in-hospital imaging (with a surge of ultrasound for deep venous thrombosis noted in COVID-19 patients), but all outpatient services have been halted. A plan is in place to manage the influx of patients in both vascular laboratory and vascular clinic that will ensue when the hospital returns to normal functioning. Overall, key learning points regarding the response for the vascular surgery division have been to remain nimble and to use technology both to stay connected with patients and to ensure that trainees and faculty are adequately cared for during this crisis.

Overall, pandemic and other health care crisis response planning should be performed by every vascular surgery department, ideally during periods of relative stability, to enable a facile response during times of need. Vascular surgeons should be prepared to offer their services in fashions other than traditional vascular surgery practice during periods of health care crisis, and every effort needs to be made to procure and to preserve adequate PPE supplies so that in periods of acutely increased demands, all health care workers, including vascular surgeons, are adequately protected in doing essential jobs. Plans should be made to supplement trainee education, as such crises are likely to have a similarly negative impact on trainee operative experience in the future. Such endeavors will limit the collateral damage caused by health care crises in the future.

![Fig 5. Response to whether the vascular surgeon has been redeployed outside his or her usual practice and in what capacity he or she has been redeployed. ED, Emergency department; ICU, intensive care unit.](image-url)
**Strengths and limitations.** Strengths inherent to this study include the novel data provided regarding attending vascular surgeon sentiment and practice patterns during the COVID-19 pandemic and the reasonably high response rate obtained during a short time. These data can be used to inform other crises by highlighting trends in practice and surgeon sentiment, and it is hoped this will inform expectations and lead to a more streamlined response during the next crisis. Because there was only a 1-week period during which responses were collected, there was unlikely to be much evolution in the practice and systems issues addressed in the survey.

A limitation of the study is that only a fraction of vascular surgeons in the country participated, and results may not be broadly generalizable. In particular, surgeons practicing in a small community hospital are not well represented, and the results are heavily skewed toward responses from academic surgeons, introducing a selection bias. These results must be interpreted with this limitation in mind. There are no physician or hospital identifiers, so there is no way to determine the number of hospitals represented by this survey. Moreover, in the interest of keeping the survey short and manageable, many of the answers were kept binary or minimally categorical. Whereas this likely increased response rate, it does not allow as much granularity in the data obtained. There were also no questions attempting to quantify the financial impact of the crisis for individual surgeons, surgeon layoffs, or use of alternative patient care tools, such as telemedicine. The survey also did not focus on trauma, so the effect on vascular blunt and penetrating trauma was not discerned. The generalizability of the findings may be affected as a result. Moreover, information on respondents vs nonrespondents was not collected as anonymity was considered paramount. Finally, these data represent a snapshot in time amid the pandemic and should be interpreted with this in mind.

**CONCLUSIONS**

The COVID-19 pandemic has resulted in practice changes for the survey respondents, including a shift to operating only for urgent and emergent indications. This has led to many untreated vascular patients, the effect of which has yet to be determined. A minority of vascular surgeons have been redeployed outside their specialty; however, this is more frequent among states with high COVID-19 case numbers. Reuse of PPE and N95 masks is common. However, adequate PPE remains an issue for 21% of vascular surgeons who responded to this survey.

**AUTHOR CONTRIBUTIONS**

Conception and design: CL, AD
Analysis and interpretation: CL, LB, CP, AT, PK, MC, ME, AD
Data collection: CL

Writing the article: CL, LB, AD
Critical revision of the article: CL, LB, CP, AT, PK, MC, ME, AD
Final approval of the article: CL, LB, CP, AT, PK, MC, ME, AD

Statistical analysis: LB

Obtained funding: Not applicable
Overall responsibility: CL

CL and LB contributed equally to this article and share co-first authorship.

**REFERENCES**

1. Xu J, Xu QH, Wang CM, Wang J. Psychological status of surgical staff during the COVID-19 outbreak. Psychiatry Res 2020;288:112995.
2. Lee CC, Thampil S, Lewin B, Lim TJ, Rippin B, Wong WH, et al. Battling COVID-19: critical care and peri-operative healthcare resource management strategies in a tertiary academic medical centre in Singapore. Anaesthesia 2020 Apr 8. [Epub ahead of print].
3. Wu Z, McGooogan JM. Characteristics of and important lessons from the coronavirus disease 2019 (COVID-19) outbreak in China: summary of a report of 72,314 cases from the Chinese Center for Disease Control and Prevention. JAMA 2020 Feb 24. [Epub ahead of print].
4. Wang J, Zhou M, Liu F. Reasons for healthcare workers becoming infected with novel coronavirus disease 2019 (COVID-19) in China. J Hosp Infect 2020;105:100-1.
5. Ng JI, Ho P, Dharmaraj RB, Wong JC, Choong AM. The global impact of COVID-19 on vascular surgical services. J Vasc Surg 2020;71:2182-3.e1.
6. Ferreini EM. The financial impact of COVID-19 on our practice. J Oral Maxillofac Surg 2020 Apr 9. [Epub ahead of print].
7. Global guidance for surgical care during the COVID-19 pandemic. Br J Surg 2020 Apr 15. [Epub ahead of print].
8. Porpiglia F, Checchi C, Amparore D, Verri P, Campi R, Claps F, et al. Slowdown of urology residents’ learning curve during COVID-19 emergency. BJU Int 2020 Apr 9. [Epub ahead of print].
9. Coccolini F, Perrone G, Chiarugi M, Di Marzo F, Ansaloni L, Scandroglio I, et al. Surgery in COVID-19 patients: operational directives. World J Emerg Surg 2020:15:25.
10. Moszkowicz D, Duboc H, Dubertret C, Roux D, Bretagnol F. Daily medical education for confined students during COVID-19 pandemic: a simple video conference solution. Clin Anat 2020 Apr 6. [Epub ahead of print].
11. DeFilippis EM, Stefanescu Schmidt AC, Reza N. Adapting the educational environment for cardiovascular fellows-in-training during the COVID-19 pandemic. J Am Coll Cardiol 2020;75:2630-4.
12. Verikokos C, Lazaris AM, Geroulakos G. Doing the right thing for the right reason when treating ruptured abdominal aortic aneurysms in the COVID-19 era. J Vasc Surg 2020 Apr 11. [Epub ahead of print].
13. Zarrintan S. Surgical operations during the COVID-19 outbreak should elective surgeries be suspended? Int J Surg 2020;78:5-6.
14. Lancaster EM, Sosa JA, Sammann A, Pierce L, Shen W, Conte M, et al. Rapid response of an academic surgical department to the COVID-19 pandemic: implications for patients, surgeons, and the community. J Am Coll Surg 2020;230:1064-73.
15. Narla S, Lyons AB, Kohli I, Torres AE, Parks-Miller A, Ozog DM, et al. The importance of the minimum dosage necessary for UVC decontamination of N95 respirators during the
COVID-19 pandemic. Photodermatol Photoimmunol Photomed 2020 Apr 14. [Epub ahead of print].

16. United States: coronavirus cases. Available at: https://www.worldometers.info/coronavirus/country/us/. Accessed April 19, 2020.

17. Rasmussen TE, Koelling EE. A military perspective on the vascular surgeon’s response to the COVID-19 pandemic. J Vasc Surg 2020;71:1821-2.

18. Livingston E, Desai A, Berkwits M. Sourcing personal protective equipment during the COVID-19 pandemic. JAMA 2020 Mar 28. [Epub ahead of print].

19. Cheng VC, Wong SC, Kwan GS, Hui WT, Yuen KY. Disinfection of N95 respirators by ionized hydrogen peroxide during pandemic coronavirus disease 2019 (COVID-19) due to SARS-CoV-2. J Hosp Infect 2020 Apr 8. [Epub ahead of print].

20. Starnes BW, Singh N. Letter from Seattle: amid COVID-19 pandemic, time to act is long past due. Available at: https://vascularspecialistonline.com/letter-from-seattle-amid-covid-19-pandemic-time-to-act-is-long-past-due/. Accessed May 1, 2020.

Submitted Apr 24, 2020; accepted May 15, 2020.

CME Credit Available to JVS Readers

Readers can obtain CME credit by reading a selected article and correctly answering four multiple choice questions on the Journal Web site (www.jvascsurg.org). The CME article is identified in the Table of Contents of each issue. After correctly answering the questions and completing the evaluation, readers will be awarded one AMA PRA Category 1 Credit™.