LETTERS TO THE EDITOR

Social distancing in apheresis medicine

During a global pandemic such as with the SARS-CoV-2 virus, precautions must be taken to limit staff exposure as much as possible. Oftentimes, this involves measures such as reducing operating room capacities, deferring physical exams in known positive patients, or the modification of the same apheresis procedures that we perform every day. In the era of COVID-19 and social distancing, we successfully modified how to perform therapeutic plasma exchanges (TPEs) to allow the apheresis staff and device to stay outside of the patient’s room for the vast majority of the procedure.

A 77-year-old white male with a severe exacerbation of myasthenia gravis (MG) was discharged after five TPEs with clinical improvement. Only 5 days later, he presented again with worsening bulbar weakness and dysphonic speech, despite compliance with prednisone, azathioprine, and pyridostigmine. Due to potential COVID-19 exposure, he was transferred to the intensive care unit (ICU), the infection was confirmed with a PCR test, and we were consulted to restart TPE. The first procedure using the Spectra Optia apheresis system (Terumo BCT, Lakewood, CO) was performed as usual exchanging one plasma volume for 5% albumin. The nurse remained in the patient’s room in full personal protective equipment (PPE) for approximately 2.5 hours. The patient tolerated TPE well and the machine was disinfected per the manufacturer’s recommendation, which includes disinfection with a 70% isopropyl alcohol solution (customer letter to TerumoBCT, “TBCT Trima Accel and Spectra Optia exposure to COVID,” March 30, 2020), in line with CDC recommendations for the disinfection of medical devices.

Prior to the second TPE, we learned from the dialysis service of their experience using two D-300 Level 1 normothermic IV fluid administration sets (Smiths Medical, Minneapolis, MN), which added an additional 6 feet of tubing to the access and return lines between the patient and the Spectra Optia. Combined with the original tubing, the total distance between the patient and the machine was approximately 12 feet, allowing the apheresis nurse and the machine to stay outside of the patient’s room throughout the exchange (Figure 1).

We estimated that the extracorporeal volume (ECV) using the extension set (which holds 90 mL each) totaled approximately 405 mL (8% of our patient’s blood volume [BV]). At the end of priming the machine with saline and ACD-A, and before connecting the patient, we manually primed the extension tubing to ensure lack of residual air. We set the inlet speed at 100 mL/min and the AC ratio to 10:1 (we typically use an AC ratio of 13:1 in nonmodified procedures) to prevent clotting in the longer tubing. We also found that it was helpful to have one nurse at the

FIGURE 1  A, Spectra Optia ready to be taken to the ICU. B, Access line with the extension tubing. C, Blood warmer with return line [Color figure can be viewed at wileyonlinelibrary.com]
bedside during access and one by the machine to confirm that the procedure was running appropriately, before the nurse inside the room discarded her/his PPE. For the first TPE performed with this modification, the patient’s hematocrit was 28%, the PLT count was $140 \times 10^9$/L, and his vital signs are shown in Figure 2. A postprocedure complete blood cell count was not performed, but his variables were unchanged 24 hours later. Two other TPEs have been performed uneventfully at this time. The same disinfection protocol performed after the first procedure was also performed for subsequent procedures due to potential viremia in the patient, as well as possible exposure on the COVID-19–positive wing of the ICU.

Modifications such as the one described here must take into consideration the additional ECV introduced by the extension tubing. Since 10% to 15% of the total BV is considered a safe ECV,4 we estimate that a minimum hematocrit to proceed with as described should be 24% and a total BV of at least 2700 mL. Thus, children or adults with low BVs would likely not be candidates or further modifications such as RBC priming would be needed.

In summary, by modifying our TPE procedure after our nephrology colleagues’ experience, we have been able to successfully treat a COVID-19–positive patient with no adverse events and minimization of nurses’ exposure. It allowed reducing the time inside the patient’s room to approximately 10 to 15 minutes compared with over 2 hours with the conventional method. Adaptations such as this help protect those on the front lines performing apheresis procedures that cannot be postponed until the COVID-19 infection is under control. We expect to learn of additional innovations as the apheresis medicine community treats more such patients.

CONFLICT OF INTEREST

The authors have disclosed no conflicts of interest.

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Transfusion services operations during the COVID-19 pandemic: Results from AABB survey

INTRODUCTION

In December 2019 several cases of atypical pneumonia were reported in the province of Wuhan in China, but it was not until 7 January 2020 that the novel coronavirus (SARS-CoV-2) was identified as the causative agent. The virus has spread throughout the world, with more than 1.7 million confirmed cases and more than 100 000 deaths.\(^1\)

This unprecedented situation has had an impact upon the community, hospitals, transfusion services and blood collection facilities.\(^2\) The AABB (formerly known as the American Association of Blood Banks) submitted a weekly questionnaire to their hospital membership to capture information regarding strategies to prevent blood shortages, decrease wastage, organize staff, and plans to use convalescent plasma. The responses help characterize changes in transfusion practice when the blood supply is challenged by a pandemic. The questionnaire was developed by the authors and distributed weekly (3/23, 3/30, 4/6, and 4/13) through email.

RESPONSE RATE AND RESPONDENT CHARACTERISTICS

The survey was sent to 887 AABB hospital members. Hospitals belonging to hospital systems were allowed to respond as a system instead of individual hospitals. The number of responses was 132, 132, 115, and 101 for the first, second, third, and fourth weeks, respectively. Across 4 weeks, the majority of the respondents were from California, Massachusetts, Minnesota, Pennsylvania, Texas, Florida, New York, and Virginia.

BLOOD BANK CHANGES IN RESPONSE TO COVID-19, STAFFING ISSUES, AND ELECTIVE PROCEDURES

Several institutions implemented prospective audits of red blood cell and platelet orders. For RBC transfusions, the majority of the institutions lowered the hemoglobin...
threshold to 7 g/dL, but only a minority decreased the threshold to less than 7 g/dL (Figure 1). For platelet transfusions, only a minority of institutions: lowered platelet count thresholds for transfusion; or discontinued prophylactic transfusions; or implemented process changes such as splitting units or extending expiration from day 5 to day 7. Between 60 and 76% of the institutions implemented more than one strategy.

The number of institutions alerted by their blood supplier about challenges in meeting inventory needs decreased from week 1 to 4, suggesting adequate supply to meet the demand. (Figure 2) The majority of hospitals had developed a plan to deal with blood shortages by week 1. Only a minority of institutions limited the number of units in a massive transfusion protocol (MTP). Only 10% of institutions continued to perform elective surgeries, and 25% of institutions reported

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**FIGURE 2**  
A, Trends in hospital impact. B, Wastage associated with cancellation of elective surgeries. C, Staffing changes. D, Convalescent plasma considerations.
having increased wastage secondary to cancelled procedures. Only a minority of respondents reassigned staff or modified schedules to ensure sufficient coverage. Less than 2% of respondents extended the allowable type and screen interval beyond 72 hours to decrease workload.

The vast majority of institutions intended to participate in a protocol and obtain an IND (investigational new drug) to transfuse convalescent plasma, and a majority also planned to assist recovered patients to donate convalescent plasma.

**DISCUSSION**

Hospital transfusion services must ensure an adequate blood inventory for patients in need. In the setting of a pandemic in which routine community activities and hospital operations are disrupted, blood utilization and supply is uncertain. Transfusion services implemented several strategies to mitigate the risk of shortages, and the vast majority of institutions discontinued elective surgeries to ensure resources are available for more acute and urgent needs. The combination of these strategies resulted in less utilization, which could have contributed to the gradual increase in wastage observed throughout the weeks. Although the therapeutic efficacy of convalescent plasma is still unknown, most of the institutions are interested in making this product available for transfusion, obtaining an IND, and plan to assist in educating recovered patients about donating plasma.

**CONFLICT OF INTEREST**

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**LETTERS TO THE EDITOR**

Transfusion medicine during COVID-19 outbreak in the hotspot of Spain

The coronavirus disease (COVID-19) pandemic was first confirmed in Spain on 31 January 2020.¹ Community transmission was confirmed in mid-February, and a national lockdown was imposed on 14 March. By 31 March, the cumulative cases in Spain were 97,724 with 8,189 deaths, and most cases and deaths in the country were recorded in Madrid with 27,968 cases and 3,392 deaths.²,³ Managing patients with COVID-19 in Madrid, the epicenter of the pandemic in Spain with more than 25,000 deaths by 4 May,³ has required innovative solutions in all departments of hospitals. The Transfusion Medicine Service of La Paz University Hospital, a tertiary care institution in Madrid, provides a 24-hour service to 49 available specialties that provides an annual health care activity of 50,000 admissions to 1,286 beds. Transfusion data from 2019 includes 19,710 red blood cell (RBC) units, 3,983 platelet pools of four to six whole blood–derived platelet concentrates, and 3,900 fresh frozen plasma (FFP) units for more than 5,000 patients.⁴ The immunohematology laboratory performs an average of 3,500 studies per month. Pandemic planning scenarios (Figure 1) have focused on minimizing the impact of blood shortages, encouraging the appropriate usage of blood products, and closely monitoring the blood demand. We processed all samples in the laboratory as “suspected” samples from 13 March to avoid the spread of the virus among laboratory personnel,
resulting in no COVID-19 cases recorded in the department. From 6 April, we implemented blood transfusion in Madrid Fair Institution (IFEMA), a temporary support hospital created in an exhibition center on 23 March, which admitted more than 3000 patients with a mild form of COVID-19 during the pandemic. We reviewed the Transfusion Medicine Service activity from 1 March 2020, to 30 April 2020, which was the peak of the pandemic when 2604 patients with COVID-19 (positive polymerase chain reaction results) were admitted, overwhelming the hospital’s capacity. Compared with the same period in 2019, the number of platelet pools transfusions performed declined by 40%. Similarly, the number of RBC transfusions performed decreased by 26% in March 2020 after elective surgery, and transplants were suspended. However, the decline in April 2020 was only 5%, a result of the increasing demand for RBCs among patients with COVID-19. A total of 823 RBC units (median, 3; range, 1-26) were transfused in 203 recipients with COVID-19 from March to April 2020. Neither platelet pools nor FFP transfusion was significant among the COVID-19-affected population. The major causes of transfusion were anemia of inflammation (69%) and bleeding (7%). The mean pretransfusion hemoglobin concentrations, as shown in Table 1, was 7.9 g/dL for the overall group, and the mean pretransfusion hemoglobin for 114 patients transfused at the intensive care unit was 8.0 g/dL. One hundred eight (95%) patients with COVID-19 transfused in the intensive care unit (ICU) were on mechanical ventilation, and 10 (9%) were on extracorporeal membrane oxygenation, while five patients (4%) were transfused due to bleeding complications. The overall need for RBC transfusion among patients with COVID-19 was 7.78% (203/2604) and increased to 48% in the group admitted to the ICU (114/237). This is in contrast with the need for RBC transfusion at IFEMA, which was significantly lower (<1%) probably due to the less severe clinical profile of patients with COVID-19 admitted to the temporary hospital. In summary, COVID-19 imposes a significant increase in the number of RBC transfusions performed among patients with severe disease. A restrictive RBC transfusion threshold for nonbleeding, hospitalized,
and most critically ill adult patients with COVID-19 and a strict adherence application of evidence-based guidelines would be advisable to attenuate transfusion-related complications and simultaneously avoid blood product supply exhaustion.

**TABLE 1** Demographic characteristics of patients with COVID-19 who received 823 RBC transfusions at La Paz University Hospital during the peak of the pandemic

| Characteristic                                      | Total patients receiving RBC units n = 203 |
|-----------------------------------------------------|-----------------------------------------|
| Age, y                                               | Mean ± SD 67.6 ± 15.5, Range 24-96      |
| Sex, n (%)                                          | Male 131 (65%), Female 72 (35%)         |
| Pretransfusion hemoglobin (g/dL)                     | Mean ± SD 7.9 ± 1.23, ICU (114 patients) 8.0 ± 1.23, Range 4.8-10.1, ICU 6.3-9.1, Restrictive transfusion threshold (7-8) 177 (87%), ICU 103 (90%) |

Abbreviations: COVID-19, coronavirus disease 2019; ICU, intensive care unit; RBC, red blood cell. *According to AABB practice guidelines.

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