

EDITORIAL

The ABC's of disaster management: Managing apheresis operations during the SARS-CoV-2 pandemic

The novel SARS-CoV-2 coronavirus disease (COVID-19) pandemic continues to accelerate affecting every state in the United States with >1.8 million cases and >106 000 deaths as of 4 June 2020.^{1,2} Although affected hospitals have both internal and external disaster plans in place for such events, apheresis operations present a unique challenge for their leadership. The highly specialized nature of apheresis nurses and physicians make them not only “essential personnel” for disaster planning operations, but also irreplaceable if they become exposed or ill. Geographical regions less affected by COVID-19 may be able to shield their staff from redeployment to other areas of the hospital for a time, but it is prudent to have a plan in place for when the need arises to choose between apheresis patient needs and overall hospital needs.

1 | STEP 1: ASSESS THE SITUATION

The first and arguably most important step in disaster management is to assess the situation and environment. Any good plan requires a clear understanding of the potential scenarios in addition to the implications as they relate to staffing, equipment, and downstream effects. Apheresis staff, particularly the nurses, are the most valuable resource at your disposal and should be shielded wherever possible. When the discussions come up about redeployment of nurses, it is prudent to remind hospital leadership that apheresis nurses are highly specialized and uniquely qualified to perform exchanges and collections. In fact, if they become ill or otherwise unable to perform procedures, most hematopoietic stem cell transplant operations will be severely impacted in addition to potentially fatal effects for patients needing emergent apheresis procedures. It should be noted that there is a need to shield nursing staff even if redeployment is not currently being considered as either nosocomial or community acquired COVID-19 infection in one staff member could lead to loss, due to quarantine, of the majority or even all apheresis staff members. This occurred at the Mayo Clinic when one staff member became ill with COVID-19 resulting in the majority of the remaining staff

undergoing quarantine. Unfortunately, in New York City, hospitals became almost entirely dedicated to COVID-19 patients, many of whom were in the intensive care wards. Protecting staff from redeployment was not an option in this situation despite having a limited number of apheresis nurses (six) for both the adult and pediatric campuses, which are covered by the Columbia University Irving Medical Center (CUIMC) centralized apheresis service.

2 | STEP 2: BE FLEXIBLE

In order to meet the greater good of aiding hospital operations during a crisis situation and continuing our mission of providing timely patient care, creativity in utilizing staff was required. First, apheresis procedures were limited to only those procedures with no other option for medical management and an urgent or emergent need (eg, thrombotic thrombocytopenic purpura) or procedures that could prevent inpatient admissions due to serious sequelae (eg, sickle cell disease patients on long-term RBC exchange regimens). Procedures which may be important for long-term care but which may not cause adverse effects in the short term if not performed (eg, lipoprotein apheresis for hypercholesterolemia, extracorporeal photopheresis for stable, mild skin graft-vs-host disease) were postponed. The 2019 American Society for Apheresis Guidelines can be used to provide an evidence-based approach when triaging cases to decide which therapeutic apheresis procedures constitute urgent or emergent indications for treatment vs which procedures to postpone.^{3,4} Strong consideration should also be given to postponing research procedures which are seeking to determine efficacy of therapies or develop new therapies.

Not only does limiting procedures conserve resources but also avoids patients potentially being exposed to COVID-19 in the health-care setting and avoids exposing staff to potentially infected but asymptomatic COVID-19 patients. For CUIMC, this effectively reduced the day-to-day apheresis procedure volume to the point where at least one-to-two apheresis nurses in addition to a resident physician on the apheresis service could be sent to other areas of the hospital to assist in COVID-19 patient care.

For the Mayo Clinic, this allowed the remaining 4 of 17 apheresis staff not under quarantine to continue to support performance of critical patient procedures. This also reduced the use of personal protective equipment in order to conserve hospital supplies of this limited resource.

3 | STEP 3: CREATIVE SCHEDULING

CUIMC apheresis required that one nurse remain in apheresis at all times (the charge nurse). This way, regardless of where the other nurses were deployed, there was always one nurse “home” in case of an emergency who could coordinate a response, which may involve bringing apheresis nurses back from other areas of the hospital. This also aids in communication with the on service/on call resident. The dialysis unit was designated as the apheresis service’s “sister unit” due to the fact that this unit is physically adjacent to apheresis and three of the six apheresis nurses had prior experience in dialysis. Dialysis therefore received preferential assignment of redeployed apheresis nurses as this area is a specialty that is difficult to backfill without prior experience. The other three nurses, when available, were sent to the main hospital with the understanding that they could not take primary care of a patient and may be pulled back in the event of an emergent apheresis case. As apheresis nurses are accustomed to obtaining, accessing, and caring for multiple forms of vascular access, they were available to change dressings, place peripheral intravenous lines, and assist the other nurses on the patient wards with any general nursing duties.

At the Mayo Clinic, as nursing staff returned from quarantine, they were divided into two teams of seven nurses which worked alternate weeks and were not to have physical interactions. In this way, if one team was exposed due to an infected team member, a second team was available to perform procedures until those exposed staff could return from quarantine.

4 | STEP 4: DON PERSONAL PROTECTIVE EQUIPMENT

Due to concerns of asymptomatic SARS-CoV-2 carriers and the potential to transmit the virus from staff to patients or patients to staff, both Mayo Clinic and CUIMC required that all nursing staff and all patients and accompanying caregivers wear masks throughout their procedures. For patients, these masks consisted

of simple surgical masks while nursing staff wore N95 masks. At CUIMC, in order to conserve N95 masks, the nurses wore an additional simple surgical mask over the top of the N95, which could then be used for multiple procedures in 1 day if needed. In order to minimize risks further, a limit of one person was placed on the number of family and friends accompanying the patient at Mayo Clinic; at CUIMC, no visitors were allowed inside the hospital unless required to provide 1:1 in-person assistance (eg, parents of small children, caregivers for patients with severe dementia or autism). Mayo Clinic also restricted the access of children, other than patients undergoing treatment, from entering the apheresis unit given concerns about a higher incidence of asymptomatic infections in this population.

5 | STEP 5: EQUIPMENT CLEANING AND QUARANTINE

5.1 | Cleaning

Another major consideration should be for the apheresis equipment. Although there is often redundancy with multiple machines, they should not all be used interchangeably with regard to COVID-19. With >80% of the hospital census devoted to COVID-19 patients at CUIMC, the risk of exposure of outpatients to a contaminated machine needed to be considered. Routine cleaning of these machines as per the manufacturer instructions should be sufficient for this virus, protecting our patients from such exposure. Mild soap solution can be used for routine cleaning on most equipment. However, for disinfecting purposes, it is very important to carefully read the instrument operator’s manual. One cleaning agent may not work for all components of the instrument. For example, Fresenius Kabi USA (Lake Zurich, Illinois) recommends that a 70% alcohol solution be used on the Amicus pump heads, spool holder, clamps, and optical system, but not the touch screen. However, diluted bleach solution can be used on the touch screen, but not the parts cleaned with alcohol. Paper towels are not to be used on the touch screen and no ammonia-containing agents can be used on the Amicus.⁵ Terumo BCT, Inc. (Lakewood, Colorado) recommends diluted solutions of sodium hypochlorite (bleach), alcohol, or ammonium chloride to disinfect the Spectra Optia or Trima.⁶ Mallinckrodt Pharmaceuticals (Staines-Upon-Thames, Surrey, United Kingdom) recommends diluted bleach or disinfectant wipes for disinfection of the CELLEX.⁷ Kaneka Pharma America LLC (New York, New York) states that diluted alcohol or diluted bleach

can be used to disinfect the LA-15 Liposorber System.⁸ It is important that instructions for each cleaning agent be followed completely, especially the time that the surface needs to be wet. Postcleaning steps may also need to be performed; for example, the diluted bleach solution leaves a white film when it dries that needs to be removed with a soft cloth.

Since there is also concern about spreading SARS-CoV-2 by contact with a contaminated surface, a procedure was established if more than one operator will be using the apheresis instrument during a procedure. Each time a new operator touches the instrument during the procedure, they will don new gloves. When the procedure is complete, the instrument will be cleaned with the diluted bleach wipe. After it dries, a soft cloth will be used to remove the white film that has formed.



5.2 | Quarantine

In addition, Terumo BCT (manufacturer of the Spectra Optia) states that no maintenance can be performed on COVID-19 exposed machines for a minimum of 96 hours post exposure. At institutions like CUIMC where this is the sole type of apheresis machine, the issue of quarantine becomes quite important and the designation of a “COVID-19 machine” can assist with this. If there is a private room, placing a sign on the machine and separating it from others is an effective way to prevent an inability to conduct maintenance on multiple machines for 4 days at a time. Depending on the demand for apheresis procedures in COVID-19 wards, more machines can be added to this quarantine area as needed. If possible, at least two machines should remain “clean,” with an additional one as backup in case of emergencies.

Finally, remember that we are in this together as a community of professionals. Your colleagues may have thought of unique and creative solutions to problems in their units. Maintain those relationships and keep the lines of communication open. This will help us weather the storm both from an operational standpoint but also personally as we face in the days ahead some of the most challenging situations many of us will see in a lifetime. As the unexpected occurs on a daily basis with field hospitals built and resources strained, we will continue to adapt and stand together during this unprecedented time in history.

CONFLICT OF INTEREST

The authors declare no conflicts of interests. Specifically, the authors have no competing financial associations, financial interests, or other possible conflicts of interest.

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