



Review

Potential challenges faced by blood bank services during COVID-19 pandemic and their mitigative measures: The Indian scenario

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ABSTRACT

The current pandemic caused by SARS-CoV-2 virus is going to be a prolonged melee. Identifying crucial areas, proactive planning, coordinated strategies and their timely implication is essential for smooth functioning of any system during a crunch.

Addressing the impact of COVID-19 on transfusion services, there are 4 potential challenges viz. blood/component shortage, donor/ staff safety, consumable supply/ logistics and catering to the convalescent plasma need. In this review article, we will be discussing about these potential challenges in detail along with the necessary mitigative steps to be adopted to tide over the COVID-19 crisis in an Indian set up.

1. Introduction

The SARS-CoV-2 (Severe acute respiratory syndrome coronavirus 2) has incited an international crisis. National response to such emergency situation is crucial, requiring rapid and timely decision making. Developed countries with integrated health care system and centralised blood transfusion services manage well [1]. But for a developing country like India, with fragmented blood transfusion services (especially dependent on replacement donation); it is a huge challenge [2]. It is important to understand the nature of the emergency and its effect on transfusion services [3]. Sometimes it is not the demand or supply which might be impacted, but a disruption in the delivery system might take a toll on the inventory.

Within four months of the diagnosis of first case in India, the current situation soared to 93,322 active cases and 5394 deaths; far from achieving the flattening of curve [4]. On 24th March 2020, a nationwide lockdown was declared in India, affecting the entire 1.3 billion population of the country. Currently the lockdown policies have been relaxed, exempting international travels, metro rail and large gatherings [5]. A data driven risk assessment and preparedness on the extent of community spread, health care system's efficacy, blood supply and operational factors; is essential to act quickly during sudden decline in blood donation numbers. As the pandemic has not yet remitted, we cannot conclude on its overall effect on transfusion services. Hence, we discuss the potential challenges that could be faced by a blood bank, in

balancing the inventory and for carrying out smooth functioning of the blood bank services and the appropriate measures to be taken in the long run.

2. Potential challenges

There could be four major stumbling blocks encountered during the lockdown period (Fig. 1).

2.1. Blood/ component shortage

“Stay safe at home” they said [6], but the extent of the lockdown and its long term impact on our day-to-day activities was least expected. All the blood donation camps had to be called off across the country and the only donor pool available were the hospital-employees, leaving the stand alone blood banks at bay. In addition, the donor selection criteria were made more stringent [7], further decreasing the donation numbers.

The previous SARS (Severe acute respiratory syndrome), MERS-CoV (Middle East respiratory syndrome corona virus) pandemics [8–10] and the current COVID-19 (Coronavirus disease of 2019) pandemic [11], observed a significant reduction in blood donation due to pan-lockdown, panic, cessation of blood donation camps and disruption of transport services owing one to reflect on the importance of a backup buffer stock [12]. Although the Government declared that only

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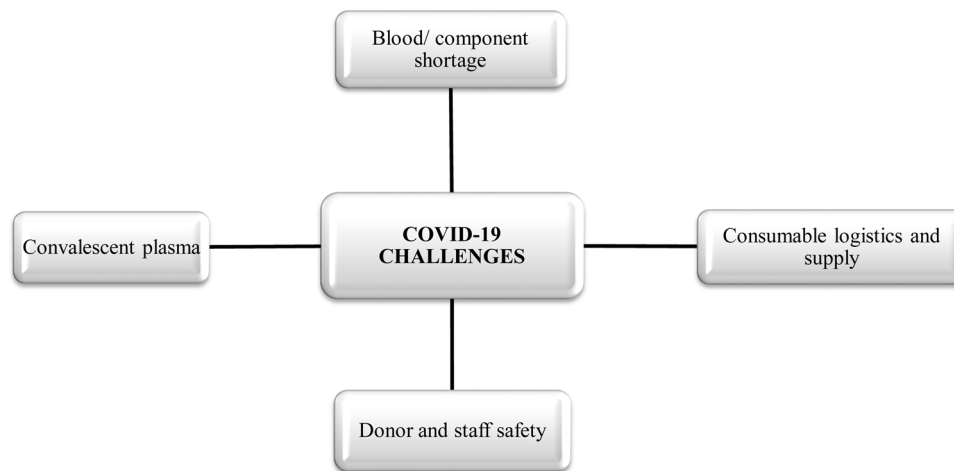


Fig. 1. Blood bank challenges during the pandemic.

emergency and COVID-19 patients are to be treated [13] which lead to postponement of all elective transfusion requirements; the Indian demand for transfusion (majorly for medical reasons such as thalassemia, haemato-oncology, blood dyscrasias and nutritional anaemia [14,15]) cannot be deferred for a long time and the obstetric-neonatal blood requirement too cannot be neglected [14].

2.2. Donor and staff safety

In an effort to maintain the inventory, the safety of donors and staffs cannot be jeopardised. Voluntary donors residing at a walk-away distance from the blood bank too might be apprehensive to turn up for donation. The blood collection sites and stations need to undergo thorough disinfection and disposal of medical waste needs to be handled more meticulously. Psychological impact of COVID-19 as a disease and the effects due to the nationwide lockdown on donors, acute or long-term, would also require attention.

Due to mobility constraints, daily commute of employees is affected. Also, employee absenteeism can be expected due to illness of self/ family or panic especially among those handling infected patient's sample. As health-care workers who are the front-line warriors are at not only at a higher-risk of contracting the disease but may also experience adverse psychological issues like burnout, anxiety, depression and PTSD (Posttraumatic stress disorder) amongst many. These issues need to be handled with patience and care [16,17]. Initiatives like virtual extracurricular courses on self-care and offering online psychiatric support will help in the emotional well-being of healthcare workers [18,19].

2.3. Consumables logistics and supply

The major predicament during this pandemic is not just the illness, but also the disruption in production and service delivery. Most of the reagents used in blood banking are manufactured abroad and due to lack of local producers the service during lockdown period was hampered.

2.4. Convalescent plasma

An additional challenge to blood banks is to provide convalescent plasma as part of registered clinical trials [20]. Although the blood demand might decrease due to cancellation of elective surgeries and routine transfusion services, the need for donors to donate convalescent plasma will steadily rise. Not all blood banks are equipped to collect plasma by apheresis technology. And even for blood banks which do perform plateletpheresis, such mass plasmapheresis donations can be

quite cumbersome.

3. Mitigative measures

Mitigative measures employed to tide over these challenges have to be in accordance with time-to-time Government's declaration.

3.1. Inventory maintenance

An adequate buffer stock helps tide over sudden emergencies especially during the initial days of lockdown, lending time to recuperate with further strategies. This also ensures an adequate stock of plasma and blood diverting the donor pool towards plateletpheresis as platelets have the least shelf life. Blood banks must predict the requirement according to the hospital they cater to and only a demand-based collection has to be done. Previous experiences in acute blood shortages were managed well by adopting an inter-regional blood transferring policy [21,22], suggesting that non-functional or stock-excess blood banks must transfer their inventory to blood banks which are in short of stock. An advisory by the National Blood Transfusion Council was issued on 25 March 2020 allowing blood banks to organise blood donation camps abiding social distancing norms and other hygiene techniques [7]. Donors preferably from safe zones were to be recruited only on a group-to-group requirement basis with a preliminary screening done telephonically which could prevent unnecessary exposure. Transfusion of thalassaemic and hemat-oncologic patients should be planned according to availability. Transfer from/to other blood banks, alternate group transfusion and FIFO (first-in-first-out) policy must be adhered strictly ensuring zero discard rate during this crucial time. The *Aarogya Setu App* is a Government of India initiative to track the contacts, prevent community spread and define safe zones. This app can be used to conduct regularly spaced small blood donation camps in safe zone with precautionary measures. Appeal through social/mass media and electronic communication can play a huge role in donor recruitment [23–25]. It is best to discourage elderly donors and donors with co-morbid illness to step outside their home.

Requirement for a rare phenotype blood can arise at any point of time which can be a challenge for transfusion services. Hence maintenance of a rare-group donor registry can save a lot of time in providing blood in times of emergencies [26,27] especially during such lockdown scenarios. Transportation should be provided to such special donors.

Other proactive measures to ensure adequate supply of blood includes tie-up with Non-Governmental Organizations (NGOs), military/para-military services, religious and charity foundations as they have the power to mobilize large number of donors in a short period of time.

Table 1
Potential challenges faced by blood transfusion services and their mitigative measures.

Potential challenges	Mitigative measure
Blood/ component shortage	Buffer stock Inter-regional blood/ component transfer FIFO policy Rare group donor registry Tie up with Non-governmental organizations/ military/ para-military forces/ religious/ charitable organizations
Donor and staff safety	Donor safety: Demand-based collection Use of <i>Aarogya Setu App</i> Donor counselling Spaced collection and other precautionary measures Staff safety Minimal numbers/ changeovers Quarantine leave PPE / Biosafety cabinets Special biomedical waste disposal measures for COVID-19 wastes Online psychiatric support
Consumable logistics and supply	Resource pooling FIFO policy Daily maintenance of blood bank equipments
Convalescent plasma harvest	Tie up with COVID-19 centres Importance to donor privacy/ confidentiality Filter out test-seeking donors

3.2. Donor and staff safety measures

Nationwide lockdowns being associated with possible psychological impact [28], counselling of donors is crucial to lower unnecessary panic and to increase their trust on the blood bank services. Provision to book an appointment, sanitization of hands, temperature screening before entering the blood bank and easy availability of masks, appropriate spacing of donor couch, frequent fumigation/disinfection of premises and additional COVID-19 questionnaire (in accordance to national guidelines) [7] are a must. In addition, it has to be mandated to the donors to inform the blood bank in case they develop any symptoms of COVID-19 within 14 days of donation⁷. Although the Centres for Disease Control and Prevention, American Association of Blood Banks and the US- Food and Drug Administration declared that there is no evidence to support transmission via blood [29–31], active hemovigilance of both donor and recipient must be carried out considering the novelty of the virus and availability of limited information. National guidelines advises to discard blood/components of such donors who are suspected/diagnosed of COVID-19 post donation [7]. Temporarily deferred donors can be encouraged to donate after their deferral period.

As for staff safety, best to function with minimal numbers, less number of duty changeovers and providing quarantine leave (according to available workforce). A duty roster keeping in mind the location of stay (safe zone), availability of daily commute, age and presence of comorbid illness is necessary. PPE (Personal protective equipment) can be provided to the employees according to guidelines [7,32,33]. Special precautions while handling COVID-19 positive samples, such as wearing biosafety level 3 protection gear, biosafety cabinets (especially in procedures generating aerosols/ droplets), disinfection of sample processing area and avoiding immediate opening of centrifuge lids after sample processing (to avoid aerosol transmission). Additional Biomedical safety measures includes usage of double layered “COVID-19” labelled bags to collect, dedicated bins (inner surface daily disinfected with 1% sodium hypochlorite), collection trolleys to transport and separate sanitation workers to transfer the wastes without delay and maintaining separate record of COVID-19 waste disposal [34].

3.3. Consumable supply and maintenance

During the pandemic, the work load of blood banks will change depending upon the patients to which services are being catered. Some blood banks may be completely/ partially shutdown, whereas some blood banks might have to work beyond their capacity. Hence, pooling of resources (consumables and testing reagents) from nearby non-functional or consumable excess blood banks will forbid any wastage. As workload decreases, equipments may undergo deterioration due to their lack of usage. To prevent this, daily maintenance and periodic quality checks should be carried out.

3.4. Convalescent plasma

Equipped and licensed blood banks must tie up with COVID-19 centres for the list of discharged patients from nearby areas and contact them telephonically for donating convalescent plasma. With the growing rate of new cases, donor recruitment for convalescent plasma should not be a problem.. If need arises, transport services should also be provided. Convalescent plasma harvest area should be demarcated separately in the blood bank for smooth workflow and to prevent unwanted exposure. Donor privacy and confidentiality is to be given extra importance pertaining to the stigma associated with this illness.

The major challenge faced will be to filter out inappropriate or test seeking donors to reduce unnecessary burden on collection centres. The approved guidelines for registered clinical trials must be strictly followed. Using the current pandemic-chaos for monetary benefits will be the aim of some. Such behaviours should be anticipated, strictly surveyed and strongly condemned.

4. Future challenges

As social distancing shall be the norm till at least end of 2020, the blood bank services need to plan accordingly. As the lockdown ceases, there may be sudden increase in the elective transfusion requirement. An emergency/ untouched donor pool mainly consisting of regular-voluntary-hospital-based blood/ apheresis/ rare-group donors must be readily available if such situation were to prevail. An overall attitude to boost the existing donor pool and reduce unnecessary transfusion will help tide over crisis. In future, a situation might occur where there will be no safe zones/ unexposed donors. Authorities must take decisions regarding blood collection during such grave times (Table 1).

5. Conclusion

As it is going to be a prolonged melee, impending challenges need to be anticipated. Identifying crucial areas, proactive planning, coordinated strategies and their timely implication is essential for transfusion services to tide over the current COVID-19 pandemic.

Summary of work done by the contributors

PJA, KK helped in design, concept. PJA, KK, TM, AS in intellectual content, literature search, editing and review; PJA did the manuscript preparation. AS is the guarantor.

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