Blood supply management amid COVID 19 pandemic: Challenges and strategies

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ABSTRACT

Background: Blood supply management amid the coronavirus disease 2019 (COVID-19) pandemic became a cause of concern. Blood donations in the pandemic reduced significantly because of travel restrictions and fear of contracting the virus by visiting blood banks. The WHO (World Health Organization), NACO (National AIDS Control Organization) and the SBTC (State Blood Transfusion Council) published guidelines to ensure the safety of blood donors and staff during the pandemic and to ensure correct procedures are followed. The blood centre physicians took measures for appropriate clinical use of blood and blood products, which reduced the number of transfusions and thereby safeguarded the blood supply for those who needed it the most. Materials and Methods: The study was conducted at the All India Institute of Medical Sciences, Bhopal, and 33 blood banks from 33 districts of Madhya Pradesh in collaboration with the National Health Mission and NACO. This was a retrospective study from pre-lockdown to lockdown and unlock phases 1 to 5 for nine months (February 2020 to October 2020) from 33 district-level blood centres of Central India, and the study compared the impact on blood supply from pre-pandemic time to the COVID-19 pandemic time. During the stipulated time period of 9 months, which included the pre-pandemic blood supply, the phases of lockdown when Section 144 was imposed in the country and the unlock phases, the management of transfusion services by the district blood banks of Central India during the COVID-19 pandemic was evaluated. The strategies adopted to maintain the blood supply and adequate inventory were studied. Results: The blood donation percentage in the district hospitals of Madhya Pradesh dropped drastically by 61.5% in February 2020 (pre-pandemic time) to 3.35% in April 2020 (COVID-19 pandemic). The nadir of fall in blood donations was seen in April 2020 (phase 1 of COVID-19 pandemic lockdown) with a zenith in February 2020 (pre-pandemic time). The minimum number of donations 8,037 (3.32%) in all 33 districts of Central India was seen in April, when the lockdown restrictions in the country were the strictest. In response to the reduced blood supply, the blood centres adopted strategies to maintain the inventory. Routine requests and inventory were monitored strictly for judicious and rational use of blood and its components. Conclusion: The motivation, dedication and the judicious use of blood products in addition to blood conservation strategies, first-in-first-out policy, maintaining an emergency stock of blood and strict monitoring by blood centre physicians led to the gradual upward trend of blood stocks, and hence blood supply management amid the COVID-19 pandemic could be sustained. Keywords: Blood stock, COVID-19 pandemic, transfusion triggers

Introduction

The coronavirus disease 2019 (COVID-19) pandemic caused widespread disruptions in the health care services globally. To
control the spread of the novel coronavirus (nCoV), a nationwide lockdown was declared on 24th March 2020. On 14th March, the government declared the nCoV outbreak as a notified disaster with the Disaster Management Act 2005 invoked, and the states were directed to enforce lockdown and restrict the movement of the public. International and domestic flights, trains, intra- and interstate bus services, and all public transport modalities were suspended. In India, the blood supply is a crucial element of the hospital service that was significantly affected by the COVID-19 pandemic. The blood centres faced decreased blood donations as well as leaves of crucial staff due to sickness or unavailability of public transport as a result of lockdown. The transfusion professionals played an important role by promoting blood donations, maintaining buffer stock, implementing principles of patient blood management (PBM) and, consequently, in blood supply management amid the COVID-19 pandemic.[1]

There are 135 licenced blood banks in Madhya Pradesh collecting around 450,000 units of blood. During the COVID-19 pandemic, the hospitals rationalized and preferentially allocated the resources for the care of patients and postponed all elective surgeries while continuing to provide emergency services. Most blood centres are hospital based and rely on voluntary blood donation camps and replacement donations for the maintenance of blood stock. The people were advised to use face masks and follow the practices of social distancing when the lockdown was subsequently eased.[2]

Inventory management directives for blood and its components were issued by the State Blood Transfusion Council (SBTC) and the National Blood Transfusion Council (NBTC). In the wake of the COVID-19 pandemic, blood donations reduced dramatically due to the social distancing implementation and cancellation of voluntary blood drives along with low donor turnout due to fears associated with community transmission of infection from public places such as hospitals and blood banks. Voluntary blood donation camps were put on hold to restrict the spread of the virus.[3]

The shortage of blood and inconsistency of blood donation drives have always been an issue in India, a situation that has become even more worrisome in the COVID-19 pandemic due to nationwide lockdown.

The most commonly used blood products are red cell concentrate, followed by fresh frozen plasma and platelet concentrate. In this scenario of the pandemic, optimum use of blood products became the need of the hour.[4]

During the COVID-19 pandemic, the blood centre physicians took measures for appropriate clinical use of blood and blood products, as well as implemented PBM partly by early identification and reversal of anaemia with haematinics or by reversal of the underlying cause. Many patients require transfusion as part of their standard care; the appropriate clinical use of blood and blood products reduced the number of transfusions and thereby safeguarded the blood supply for those who needed it the most.[5] The blood centres took measures to increase blood donations and motivated the patient's attendants for blood donation. The educational and communication skills of the blood centre staff also helped to wade through the pandemic and motivated and encouraged people to donate blood. The blood centres worked in coordination and facilitated the supply of components across the centres during the pandemic. Blood donation during the pandemic reduced because of travel restrictions and fear of contracting the virus by visiting the blood banks. The WHO (World Health Organization), NACO (National AIDS Control Organization) and SBTC published guidelines to ensure the safety of blood donors and staff during the pandemic and correct procedures are followed.

The study aimed to elaborate on the pattern and trend of blood donation, both before and during the pandemic, and the impact of lockdown, policies and strategies adopted to maintain blood stocks during the pandemic. This gave insights to form a crucial policy framework for the blood supply management both during the pandemic and for the future.

Materials and Methods

The retrospective study was conducted from February 2020 to October 2020 at the All India Institute of Medical Sciences, Bhopal, and 33 blood banks from various districts of Madhya Pradesh in collaboration with the National Health Mission and National AIDS Control Society, who were participants in the study. The study included data from 33 districts of Madhya Pradesh and included data updated regularly on the e-Raktkosh portal and NACO. The data were taken from the beginning of the first week of February till October 2020 for a period of 9 months when the lockdown was implemented in the country. Details of the blood units collected both voluntarily and for replacement were retrieved from the NACO and e-Raktkosh. During the stipulated time period of 9 months, which coincided with pre-lockdown period to the different phases of lockdown including phase 1 when Section 144 was imposed in the country, the management of transfusion services by the district blood banks of Central India during the COVID-19 pandemic was evaluated.

Blood donation showed distinct trends from pre-pandemic to phase 1 of strictest lockdown to phases 2 to 6 of lockdown, which coincided with the easing of lockdown. Therefore, to describe these trends, the study period was divided into pre-lockdown (PL: February 2020 to 24 March 2020), phases of lockdown (LD 1 to LD 4: 25 March 2020 to 31 May 2020), unlock phases 1 and 2 (UL 1–2: 1 June 2020 to 31 July 2020) and unlock phases 3 to 5 (UL 3–5: August 2020 to October 2020).

The trend of blood donation from PL to LD to UL 1–2 and UL 3–5 was analysed and evaluated.

The data were obtained from the NACO and National Health Mission and entered into Microsoft Excel and analysed to
calculate the blood donation trends in the various phases and the various strategies adopted to maintain blood supply.

Results

The advent of the pandemic was associated with a sharp decline in the total number of donations. Even before the announcement of lockdown on 24 March 2020, the total number of donations fell drastically in March with the media reports of person-to-person COVID-19 transmission globally. In this section, we describe the blood donation trend during the four time periods PL, LD 1 to LD 4, UL 1–2 and UL 3–5. The sharp decline in the donations ranged from 148,741 (61.5%) in February to 8,580 (3.54%) in March with the lowest number of donations in April being 8,037 (3.32%), as it coincided with the strictest lockdown period wherein Section 144 was imposed.

The drop in the voluntary as well as replacement blood donations was significant, and the month of April had the least number of donations. The number of blood donations improved marginally with the unlock phases from phase 1 to phase 5.

The PL period showed a gradual fall in blood donations mainly in March 2020. February had a total no of 148,741 blood donations, out of which 127,133 were voluntary blood donations and 21,608 were replacement blood donations. March 2020, however, reflected a drastic fall in blood donations with 8,580 donations only, but the voluntary blood donations were higher than replacement donations. The blood stock available from February 2020 was adequate to manage the blood supply in March 2020.

LD 1 and 2 showed a drastic drop in blood donations, and the least number of units were collected in April 2020, and this period coincided with the strictest lockdown with Section 144 imposed across the state. The blood donations dropped to 8,037 units, and a major drop was seen in voluntary blood donations, and the blood stocks consisted of mainly replacement donations. LD 2 showed a slight improvement in blood donations, which increased to 12,353, and voluntary donations started increasing, and 10,040 were voluntary donations and 2,313 were replacement donations.

UL 1 and 2 showed a marginal increase in blood donations with 12,941 total blood donations in June 2020, of which majority were voluntary blood donations and only 2,339 were replacement donations, and total blood donations in July 2020 were 13,196, with majority (10,831) being voluntary blood donations and only 2,365 were replacement donations.

UL 3–5 showed a trend similar to UL 1–2. The total donations during UL 3 were 11,971, with 10,482 voluntary blood donations and 1,489 replacement blood donations. UL 4 had 13,748 total blood donations, with 11,294 voluntary blood donations and 2,454 replacement blood donations. UL 5 had 12,375 total blood donations, with 10,103 voluntary blood donations and 2,272 replacement blood donations.

The total, and especially the voluntary, blood donations declined drastically in district blood banks from 127,133 (63.47%) in February 2020 to 7,030 (3.52%) in March 2020, and the steepest fall was observed in April 2020 with 1,926 (0.96%) donations [Table 1 and Figures 1–3].

Even with the unlock phases from June 2020 (phase 1) till October 2020 (phase 5), the blood donations have improved only marginally, with voluntary blood donations being more than replacement blood donations. This coincided with the unlock phases and relaxation in the movement of people and public transportation facilities. Figure 3 depicts the blood donations from February 2020 before pandemic-associated PL till UL 5 in October 2020. It shows a sharp fall in both voluntary and replacement blood donations with lockdown and a marginal, gradual improvement in voluntary blood donations during the unlocking phases.

The measures taken by the transfusion medical officers with the support of the NHM and political motivation; finally, the bloodstock started showing marginal improvement from June.
However, the two

| Month   | Total No. of Donations in District Blood Banks (M.P.), n (%) | Voluntary Donations in District Hospital Blood Banks (M.P.), n (%) | Replacement Donations in District Blood Banks (M.P.), n (%) |
|---------|----------------------------------------------------------|---------------------------------------------------------------|------------------------------------------------------|
| February | 148,741 (61.8%)                                         | 127,133 (63.74%)                                            | 21,608 (50.8%)                                      |
| March    | 8,580 (3.54%)                                           | 7,030 (3.52%)                                               | 1,550 (3.64%)                                      |
| April    | 8,037 (3.32%)                                           | 1926 (0.96%)                                                | 6,111 (14.37%)                                     |
| May      | 12,353 (5.10%)                                          | 10,040 (5.03%)                                              | 2,313 (5.44%)                                      |
| June     | 12,941 (5.34%)                                          | 10,602 (5.31%)                                              | 2,339 (5.50%)                                      |
| July     | 13,196 (5.45%)                                          | 10,831 (5.43%)                                              | 2,365 (5.56%)                                      |
| August   | 11,971 (4.94%)                                          | 10,482 (5.25%)                                              | 1,489 (3.50%)                                      |
| September| 13,748 (5.68%)                                          | 11,294 (5.66%)                                              | 2,454 (5.77%)                                      |
| October  | 12,375 (5.11%)                                          | 10,103 (5.06%)                                              | 2,272 (5.34%)                                      |
| Total    | 241,942                                                 | 199,441                                                     | 42,501                                             |

2020 onwards. The donation trend started showing an improving trend from June onwards when UL 1 relaxation measures were implemented.

**Discussion**

The importance of blood supply and adequate bloodstock in any health care system is of paramount importance. The bloodstock can only be maintained by blood donation and requires vigilant monitoring for adequate blood inventory. India needs to take consistent, proactive measures to prevent the surgery blood drought and provide safe blood to patients and develop a sustainable self-sufficient voluntary blood donation program. Blood donations, supply, and blood safety posed a huge challenge due to the spread of the nCoV. The blood donor recruitment was largely impacted as the nCoV has a long incubation period ranging on an average up to 14 days and many individuals having an asymptomatic infection. Section 144 was implemented at many places across the state, which led to restrictions on the number of people at gatherings, and this jeopardized the voluntary blood donation drives, thus straining the blood bank stock and blood supply. The availability of blood for sickle cell anaemia, thalassemia, cancer patients, postpartum haemorrhage, and emergency surgeries was impacted.

The low blood stock led to a shortage of blood, which further deteriorated with the cancellation of voluntary blood donation drives.

The transfusion services across the state took measures to maintain the bloodstock for needy patients. The state national health mission took proactive measures to maintain stock in blood banks by allocation and transfer of bloodstock from neighbouring districts and provided logistic support with adequate cold chain maintenance. The voluntary donors were contacted telephonically, and those willing to donate were given donor e-passes so as to ease their movement as Section 144 was imposed in many parts of the state. The blood centre physicians, paramedics, and nurses took the initiative and donated blood. The Red Cross started blood mobile van services for home collection of blood by voluntary donors. Requests were made to FM radio stations, and requests for voluntary blood donations were announced in the media. Voluntary blood donation camps were promoted, but small staggered camps were advised. The NBTC issued an advisory on the deferral period for suspected COVID-19 patients. E-donor cards were issued by blood banks, and voluntary donors were provided transportation facility as the state was in complete lockdown. However, the two most important reasons of barriers to blood donations during pandemic were fear of contracting the infection among the donors by visiting high-risk areas such as hospitals or blood banks and the inability to reach the blood collection centre due to restrictions imposed by the administration in view of the evolving public health situation.

NBTC directed blood banks to take permission letters from SBTC for movement of the team with blood mobile transportation van. The NBTC interim guidelines issued on 25 March 2020 laid stress on resuming both indoor and outdoor camps so that blood supply is uninterrupted; however, it also emphasized the maintenance of social distancing norms, infection control guidelines of COVID-19, and biomedical waste disposal rules. The directive also stated to issue appointment letters to voluntary blood donors to facilitate their movement towards blood centres for voluntary blood donation.

A social distancing advisory was issued by the Ministry of Health and Family Welfare. The prospective voluntary blood donors were encouraged to register on the e-Raktkosh portal. The e-Raktkosh portal was advised to be used as a single point for furnishing real-time information on the current status of stocks of each blood group and maintaining records of donors. The e-Raktkosh portal was also monitored by the Prime Minister's Office, and therefore the blood banks in the state were directed to update blood availability in the e-Raktkosh portal regularly.

The blood centres took extra safety measures pertaining to infection prevention such as wiping of donor-touched areas, regular handwashing for personal protection, and routine procedures of use of sterile collection sets for every donation and arm preparation with an aseptic cleanser. Extra measures in laboratory protocols such as personal protective equipment for employees, cleaning the surfaces and floors with hypochlorite and changing the style of waiting line chairs were undertaken.

The pre-donation screening included a physical examination of each prospective donor, and their temperature was taken.
Individuals who volunteered to donate were asked for contact history with COVID-19-infected patients, and donors with abnormal temperature or dry cough symptoms were not allowed to donate blood. A quarantine policy was implemented for the medical staff who had had close contact with the infected donors or COVID-19 patients. Donors were advised to contact blood banks if they developed a rise in temperature or cough or symptoms of nCoV infection.

It is imperative that the judicious use of blood products should be encouraged, in addition to blood conservation strategies, at this hour of the pandemic, when there is an obvious nationwide decline in blood donations and blood reserves due to various reasons as discussed earlier. The primary care physicians motivated the patient’s attendants to donate blood as the shortage of blood supply affected the patient management during the pandemic. The primary care physicians also played an important role in the judicious use of blood during the pandemic.

The transfusion requirements also reduced during the COVID-19 initial phase of lockdown as outpatient services were suspended to contain the spread of the COVID-19 infection. The blood supply was initially managed by an increase in the replacement blood donations followed by staggered small blood donation drives and donor calling and contacting voluntary donors telephonically. The blood centres implemented a first-in-first-out policy to prevent the expiry of blood units.

Conclusions

In conclusion, it could be safely said that barring few scenarios, there was a decline in the demand for blood products during the pandemic due to various reasons, but the nationwide lockdown and fear of transmission of infection have also played a role in the decreased blood supply in various health facilities. The decline in blood donations and consequently decreased blood stocks posed blood donation problems for chronic transfusion-dependent patients, road transport accident victims, patients on chemotherapy and haemodialysis, and also critically ill COVID-19 patients with multi-organ failure.

The blood centre physicians play a central role in virtually all blood centre elements and operations either with direct or indirect responsibilities. The blood centre physicians took measures to motivate the blood donors, maintain the blood inventory for emergency transfusion needs and communication with clinicians on the judicious use of blood products so that the transfusion requirements could be met during the COVID-19 pandemic. The donor calling from the list of voluntary blood donors maintained in blood centres played a crucial role in fulfilling emergency specific blood group requirements.

It was the motivation, dedication and networking of blood centre physicians along with communication with the blood donors that the blood stocks gradually showed an upward trend and the blood supply management amid the COVID-19 pandemic could be sustained.

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Conflicts of interest

There are no conflicts of interest.

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