

A Study of Blood Transfusion Services before and during the COVID-19 Pandemic in a Tertiary Care Hospital

Farida Parvin^{1*}, Tashmim Farhana Dipta², Zakia Akter³, Jannatul Ferdous Reshma³, Tamanna Mahfuza Tarin⁴, Mohammad Abdul Aleem⁵, Mohammad Ali⁵, Samira Humaira Habib⁷

1. Associate Professor,
Transfusion Medicine and Clinical
Haematology Department,
BIRDEM General Hospital and
Ibrahim Medical College, Dhaka.
2. Professor and Head,
Transfusion Medicine and Clinical
Haematology Department,
BIRDEM General Hospital and
Ibrahim Medical College, Dhaka.
3. Medical Officer,
Transfusion Medicine and Clinical
Haematology Department,
BIRDEM General Hospital,
Dhaka, Bangladesh.
4. District SRHR Officer,
DGHS, Bangladesh.
5. Resident Medical Officer,
Matrichaya Hospital,
Raipur, Lakshmipur, Bangladesh.
6. Assistant Professor,
Department of Colorectal Surgery,
Shaheed Suhrawardy Medical
College, Dhaka, Bangladesh.
7. Joint Director,
Bangladesh Diabetic Association
(BADAS), Dhaka, Bangladesh

*Address for Correspondence:

Dr. Farida Parvin,
Associate Professor,
Department of Transfusion Medicine
& Clinical Haematology,
BIRDEM General Hospital, Dhaka,
Bangladesh.
dr.farida1984@gmail.com

Submitted: 12 – Aug - 2024

Accepted: 05 – Oct - 2024

ABSTRACT

Background: The primary goal of safe blood transfusion services is to ensure continuous and easy access to blood components. However, during the COVID-19 pandemic, there was a sudden interruption at all levels of healthcare. The widespread transmission of the coronavirus prompted the government of Bangladesh to implement a nationwide lockdown. In this article, we have compared the blood transfusion services provided in the year 2019 with the impact of the COVID-19 pandemic on these services in 2020, focusing particularly on blood collection and supply. The aim was to assess the impact of the COVID-19 pandemic on blood transfusion services.

Methodology: This retrospective study was conducted in the Department of Transfusion Medicine and Clinical Haematology at BIRDEM, Dhaka. The study assessed blood collection from donors and the supply of blood components to recipients retrospectively from January 2019 to December 2020. Data were collected from record registers, and analyzed as percentages and proportions.

Results: In 2019, a total of 12,296 blood units were collected, whereas in 2020, the number dropped to 9,713. The overall supply of blood components in 2019 was 13,582, but this decreased to 9,486 in 2020. There was a reduction of 27.5% in the supply of blood components and a 21% decrease in the collection of blood from donors. Notably, there was a significant decline observed in both the collection and supply of blood during April and May of 2020.

Conclusion: During the COVID-19 pandemic, there was a detrimental effect on blood supply and collection, which negatively impacted blood transfusion services. A suitable national guideline with a flexible blood transfusion policy can help address challenges related to safe blood transfusion services during the pandemic.

Keywords: Blood donation, Blood components, Blood transfusion service, COVID-19 pandemic.

INTRODUCTION

Transfusion therapy plays a crucial role in modern clinical practice. Blood transfusions are essential during many medical emergencies, including postpartum hemorrhage, trauma, major surgical procedures, organ transplants, complicated malignancies, and various blood disorders such as thalassemia, hemophilia, and sickle cell

anemia. The COVID-19 pandemic, triggered by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), was initially detected in Wuhan, China, in December 2019. Since its emergence, it has rapidly spread across the globe, leading to substantial disruptions in healthcare systems worldwide, including blood transfusion

services.^{1,2} The World Health Organization declared the coronavirus outbreak a pandemic as countless individuals worldwide were dying from this infection. In response, many countries implemented lockdowns to control the spread of the virus.³ The COVID-19 pandemic has created unparalleled challenges in managing blood component inventories, as community and hospital activities have redirected from their standard routines to address pandemic-related needs. One of the critical factors influencing a country's blood supply is the number of blood donors.^{4,5} The first official case of COVID-19 was reported on March 8, 2020, and the first death from the virus occurred on March 18, 2020. A nationwide lockdown and related restrictions began on March 24, 2020. The pandemic significantly impacted the healthcare system, similar to other developing countries.⁶ By June 2020, Bangladesh had recorded a total of 98,330 confirmed COVID-19 cases and 1,197 deaths, marking the peak of the pandemic in that year. As of July 5, 2021, the total number of confirmed cases in Bangladesh had risen to 950,000, with 15,229 deaths reported to the World Health Organization (WHO). Globally, by the same date, there had been 183.56 million confirmed COVID-19 cases and 3.98 million deaths, according to WHO.⁷ Blood transfusions are essential across all medical disciplines. The onset of the COVID-19 pandemic raised significant concerns about maintaining an adequate and safe blood supply to meet patient needs. Many regions around the world experienced severe shortages in blood supply and increased demand, which profoundly impacted blood transfusion services.^{8,9} The Transfusion Medicine Department is responsible for recruiting donors and testing donated blood, making direct donations the primary source of blood.¹⁰ In the present study, we compared blood transfusion services before and during the COVID-19 pandemic to assess the impact of the pandemic on blood collection and the supply of blood components.

METHODS

This current study was conducted in the Department of Transfusion Medicine at BIRDEM, Dhaka. We assessed blood collection from donors and the supply of blood components to recipients retrospectively over a two-year period, from January 2019 to December 2020.

Blood collection data was obtained from donations made by replacement donors, while supply data was gathered from various blood components issued to patients, including packed red blood cells (PRBCs), whole blood (WB), random donor platelets (RDPs), single donor platelets (SDPs), and fresh frozen plasma (FFPs). All data were sourced from the departmental register book and online monthly statements and were analyzed retrospectively. The data were then tabulated and results were recorded.

RESULTS

During the study period, total blood collections from donors were 12,296 in 2019 and 9,713 in 2020. All blood components were primarily collected from replacement donors, as illustrated in Table 1. The highest number of donations occurred in September 2019 and October 2020 as shown in Figure 1. There was a significant decline in blood donations during April and May 2020, with a 21% drop in collections from blood donors. During the study period, a total of 13,582 blood components were supplied in 2019, while 9,846 were supplied in 2020. In 2019, the components supplied included 7,825 units of red cell concentrate (RCC), 3,486 units of whole blood, 1,592 units of fresh frozen plasma (FFP), 519 units of random donor platelets (RDP), and 160 units of single donor platelets (SDP). The supply of various blood components during 2019 and 2020 is shown in Table 2. In 2020, the supply decreased to 5,692 units of RCC, 2,555 units of whole blood, 1,178 units of FFP, 352 units of RDP, and 69 units of SDP. The effect of the COVID-19 pandemic led to a 27.5% decrease in the supply of various blood components. A significant decline in blood supply to recipients was observed in April and May 2020, as shown in Figure 2

Table 1: Blood collection from donor during 2019 and 2020

Months	2019	2020
January	823	806
February	958	973
March	1059	922
April	1136	459
May	1043	445
June	654	675
July	1105	781
August	1064	792
September	1197	885
October	1180	1067
November	1137	961
December	940	947
Total	12296	9713

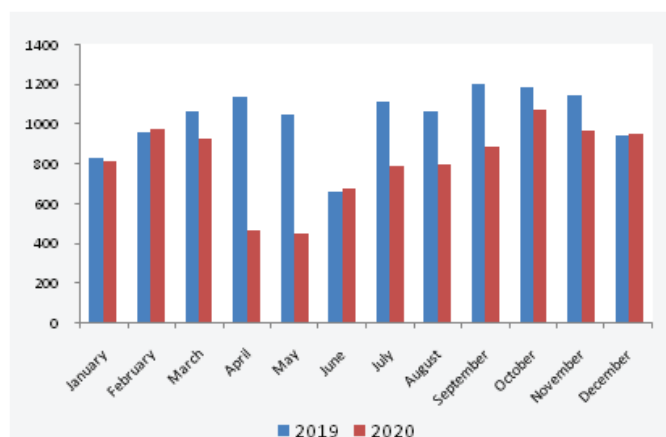


Figure 1: Trends of blood collection from donor during 2019 and 2020

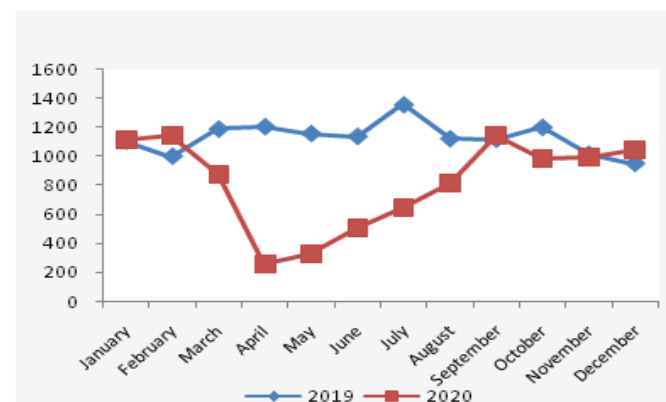


Figure 2: Supply of Blood Components during 2019 and 2020

Table 2: Various blood components supplied during the year 2019 and 2020

Supplied components	RCC		Whole blood		FFP		RDP		SDP	
Year	2019	2020	2019	2020	2019	2020	2019	2020	2019	2020
January	642	647	287	289	135	133	35	38	8	5
February	580	664	260	297	120	139	34	39	7	6
March	690	510	309	227	146	105	38	29	8	5
April	704	148	312	66	144	30	39	8	9	3
May	674	188	301	85	138	39	37	10	10	2
June	661	293	283	131	136	60	45	17	15	2
July	762	369	353	152	155	77	71	41	20	5
August	635	462	277	211	119	97	65	42	28	8
September	639	652	281	313	122	137	53	32	25	10
October	697	572	312	255	142	117	39	31	13	9
November	589	577	264	258	121	119	33	32	9	7
December	552	610	247	271	114	125	30	33	8	7
Total	7825	5692	3486	2555	1592	1178	519	352	160	69

DISCUSSION

The SARS-CoV-2 epidemic has disrupted blood storage management at large, decentralized blood centers. Various strategies have been suggested to ensure an adequate blood supply to meet transfusion needs¹¹. The reduction in blood demand during the COVID-19 pandemic was mainly attributed to fewer hospital admissions and elective surgeries, which led to a focus on preserving blood supplies for emergencies. A recent World Health Organization (WHO) report estimated that the pandemic resulted in a 20% to 30% decrease in blood donors across many countries¹². In our study, blood donations in 2020 decreased by 21% compared to 2019. There was a notable 58% decline in donations during April and May 2020. The lowest donor declination rate was observed by Gracia-Erce JA et al.¹³ (20.1%), while higher rates were reported in studies by Ogar CO et al.¹⁴ (26.1%), Politis C et al.¹⁵ (36%), and Dhote SW et al.¹⁶ (43.35%). Raturi M et al.¹⁷ reported that there was a significant reduction in blood donations, ranging from 40% to 67%, during the COVID-19 outbreak, particularly in countries where movement restrictions were implemented. Rafi AH et al.¹⁸ reported that the 70% reduction in donor turnout was primarily due to limited transportation facilities, while the remaining 30% was attributed to fear of contracting COVID-19. Several measures were implemented to enhance blood collection, with donor recruitment being a significant challenge. Donors were apprehensive about the risk of infection in hospitals or blood banks, a concern also highlighted in other studies^{19,20}. Donors were encouraged to increase blood donations through social media campaigns and telephone outreach. Additionally, during periods of blood shortage, donor passes were issued to facilitate their movement during lockdowns²¹. The total number of blood components supplied by our department was 13,582 units in 2019, which decreased to 9,846 units in 2020. In 2019; there was little variation in the supply of whole blood, PRBCs, and FFP throughout the year. However, variations were observed in the supply of RDPs and SDPs, with peak supplies occurring in July and August due to

the high incidence of dengue fever.

In 2020, blood supply levels in January and February were similar to those in 2019. However, following the start of the national lockdown in March 2020 due to the COVID-19 pandemic, blood supply levels decreased. A significant decline in the supply of all blood components was observed in April, May, and June 2020 (Figure 2). During this period, the supply of PRBCs and whole blood decreased by 75%, RDPs and SDPs by 73%, and FFPs by 64%, due to reduced blood demand. The reduction in blood demand during the COVID-19 pandemic was primarily due to fewer hospital admissions and elective surgeries, which led to a focus on preserving blood supplies for emergencies. Similar challenges were reported in a study by Yahia et al.,¹⁰ and hospitals experienced comparable issues during previous coronavirus outbreaks^{22,23,24}.

An adequate blood supply can be ensured through donations at designated blood transfusion centers, primarily from volunteer donors and occasionally from paid donors in urgent situations, such as during disasters and the COVID-19 pandemic^{25,26}. In emergencies like the current COVID-19 pandemic, blood donation and management of the blood supply present significant challenges and obstacles for the healthcare system. The Transfusion Medicine Department can play a crucial role in ensuring blood transfusion services by implementing strategic policies and plans to enhance blood availability and address shortages during such emergencies.

CONCLUSION

Blood donation is essential to the global blood supply, as blood cannot be artificially produced. This study highlighted that the COVID-19 pandemic negatively impacted both blood donation and blood supply, thereby adversely affecting blood transfusion services. Establishing an effective communication system to regularly engage and encourage donors, along with maintaining open channels with neighboring blood transfusion centers, will greatly aid in managing the blood supply during this pandemic.

FINANCIAL SUPPORT & SPONSORSHIP

Nil.

CONFLICTS OF INTEREST

There are no conflicts of interest.

REFERENCES

1. Kumar SU, Kumar DT, Christopher BP, Doss CGP. The rise and impact of COVID- 19 in India. *Front Med.* 2020; 7:01-07.
2. Stanworth SJ, New HV, Apolseth TO, Brunskill S, Cardigan R, Doree C, Germain M et al (2020) .Effects of the COVID-19 pandemic on supply and use of blood for transfusion. *Lancet Haematol* 7(10):e756–e764. [https://doi.org/10.1016/S2352-3026\(20\)30186-1](https://doi.org/10.1016/S2352-3026(20)30186-1)
3. Nigam R, Pandya K, Luis AJ, Sengupta R, Kotha M. Positive effects of COVID-19 lockdown on air quality of industrial cities (Ankleshwar and Vapi) of Western India. *Sci Rep.* 2021; 11(1):1–12.
4. Pagano MB, Hess JR, Tsang HC, Staley E, Gernsheimer T, Sen Net al (2020) Prepare to adapt: blood supply and transfusion support during the first 2 weeks of the 2019 novel coronavirus (COVID-19) pandemic affecting Washington State. *Transfusion* 60(5):908–911. <https://doi.org/10.1111/trf.15789>
5. Pandey HC, Coshic P, Chippy CS, Arcot PJ, Kumar K (2020). Blood supply management in times of SARS-CoV-2 pandemic challenges, strategies adopted, and the lessons learned from the experience of a hospital-based blood centre. *Vox Sang* 116 (5):497–503.
6. Arcot, K. Kumar, T. Mukhopadhyay, A. Subramanian, Transfusion and Apheresis Science. Elsevier Ltd P.J. Potential challenges faced by blood bank services during COVID-19 pandemic and their mitigative measures, The Indian scenario 59 (2020) 102877, <https://doi.org/10.1016/j.transci.2020.102877>.
7. Covid-19 Pandemic in Bangladesh: Policy Responses and its Impact” Special Publication, July, 2021, Section 2: Covid-19 Scenario in Bangladesh
8. Al-Riyami AZ, Abdella YE, Badawi MA. The impact of COVID-19 pandemic on blood supplies and transfusion services in Eastern Mediterranean Region. *Transfus Clinique et Biologique.* 2021;28 (1):16–24. doi: 10.1016/j.traci.2020.11.002
9. Garcia-Lopez J, Delgadillo J, Vilarrodona A, et al. SARS-CoV-2/ COVID-19 pandemic: first wave, impact, response and lessons learnt in a fully integrated Regional Blood and Tissue Bank. *Narrative Rep Blood Transfus.* 2021; 19(2):158. doi:10.2450/2021.0259-20
10. Yahia AIO. Management of blood supply and demand during the COVID-19 pandemic in King Abdullah Hospital, Bisha, Saudi Arabia. *Transfus Apheresis Sci.* 2020; 59(5):102836. doi:10.1016/j.transci.2020.102836
11. Costa CB, Cortez AJP, Adão DD, de Almeida CM, Taguchi EM, de Oliveira I, et al. Optimization of red blood cell unit storage during SARS-COV-2 Pandemic: Adopting new strategies to ensure supply in a decentralised blood bank in Brazil. *Hematol Transfus Cell Ther.* 2021;(xx-):01-07.
12. Gilchrist PT, Thijsen A, Masser BM, France CR, Davison TE. Improving the donation experience and reducing venipuncture pain by addressing fears among whole-blood and plasma donors. *Transfusion.* 2021. doi:10.1111/trf.16407
13. García-Erce JA, Romón-Alonso Í, Jericó C, Domingo-Morera JM, Arroyo- Rodríguez JL, Sola-Lapeña C, et al. Blood donations and transfusions during the COVID-19 pandemic in Spain: Impact according to autonomous communities and hospitals. *Int J Environ Res Public Health.* 2021;18(7):01-16.
14. Ogar CO, Okoroiwu HU, Obeagu EI, Etura JE, Abunimye DA. Assessment of blood supply and usage pre- and during COVID-19 pandemic: A lesson from non-voluntary donation. *Transfus Clin Biol.* 2021;28(1):68-72 Available from: <https://doi.org/10.1016/j.traci.2020.10.004>.
15. Politis C, Richardson C, Hassapopoulou-Matamis H, Politi L, Hatziaepiou K, Grouzi E, et al. Strategies for blood collection and optimization of the blood supply chain during the COVID-19 pandemic in Greece. *ISBT Sci Ser.* 2020; 15(4):386-92.
16. Dhote SW, Srivastava AR. Trends of Blood Transfusion Services before and during COVID-19 Pandemic- A Retrospective Study from Maharashtra, India, *Journal of Clinical and Diagnostic Research.* 2021 Dec, Vol-15(12): EC19-EC22, P: 19-22
17. Raturi M, Kusum A. The blood supply management amid the COVID-19 outbreak. *Transfus Clin Biol.* 2020; 27(3):147-51. Available from: <https://doi.org/10.1016/j.traci.2020.04.002>.
18. Rafi AM, Bhaskaran R. Impact of COVID 19 on Blood Transfusion Services and Strategies Used in Kerala. 2021 *Global Journal of Transfusion Medicine AATM*, P: 166-170
19. Landro L. New flu victim: blood supply. Available at <https://www.wsj.com/articles/SB10001424052748703808904574525570410593800>. Accessed on 9 April 2020.
20. World Health Organization. Maintaining a safe and adequate blood supply during pandemic influenza: guidelines for blood transfusion services. Geneva, Switzerland: World Health Organization. 2011.
21. Sharma S, Bundas S, Malakar PC, Sharma A, Gupta A. A comparative study of blood transfusion services before and during COVID-19 pandemic and the challenges

- faced: retrospective study done at a tertiary care hospital in North Western India. *Int J Community Med Public Health*. 2021 Apr;8(4):1788-1791
22. Gschwender AN, Gillard L. Disaster preparedness in the blood bank. *Am Society Clin Laboratory Sci*. 2017; 30(4):250-7.
23. Teo D. Blood supply management during an influenza pandemic. *ISBT Science Series*. 2009; 4(2):293-8.
24. Kim KH, Tandil TE, Choi JW, Moon JM, Kim MS. Middle east respiratory syndrome coronavirus (MERS-CoV) outbreak in South Korea, 2015: epidemiology, characteristics and public health implications. *J Hospital Infect*. 2017; 95(2):207-13.
25. Gammon RR, Rosenbaum L, Cooke R. Maintaining adequate donations and a sustainable blood supply: lessons learned. *Transfusion*. 2021; 61(1):294–302. doi: 10.1111/trf.16145
26. Chang L, Yan Y, Zhao L, et al. No evidence of SARS-CoV-2 RNA among blood donors: a multicenter study in Hubei, China. *Transfusion*. 2020; 60(9): 2038–2046. doi:10.1111/trf.15943