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Original Research Article

COVID-19 Pandemic and its Impact on Blood Transfusion Services at A Tertiary Care Hospital Blood Bank in Northern India

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Abstract

Introduction: COVID-19 was a public health emergency and declared it as a pandemic by WHO. During this pandemic every branch of health care delivery system was negatively affected including Blood Transfusion Services (BTS). The main objective of this study is to compare the blood donations, issued and wasted units of blood and their components during pre-COVID and COVID period.

Materials and Methods: It was a retrospective cross-sectional study and data of all voluntary and replacement donations, issue and wastage of blood and blood components were collected from 1st April 2019 to 31st March 2021. This duration was divided into pre COVID period from April 2019 to March 2020 and COVID period from April 2020 to March 2021 for this study purpose.

Results: During the study period total 2818 blood donation were observed. Out of this 1818 donations were in pre COVID and 1000 donation occurred in COVID period. The mean with SD of collected blood units per month in pre COVID was 151.5±73.46, while during COVID 19 it was 83.33±36.79 (*p* value 0.0088). A total 4036 units of blood and blood products were issued during study period. In pre COVID period 2592 units (mean/month 216±108.46) were issued, and 1444 units (mean/month 120.33±57.97) were issued during COVID period (p value 0.0132).

Conclusion: To maintain stable reserve and ensure availability of safe blood to the patients an emergency preparedness plan is necessary and blood banks must follow the guidelines given by national and international authorities.

Keywords: COVID-19, Blood donation, Blood transfusion services, Blood wastage.

Introduction

The outbreak of severe acute respiratory syndrome corona virus 2 (SARS-CoV-2), also known as COVID-19, has killed millions of people globally and the first

case was reported in Wuhan, Hubei Province, China [1, 2]. In March 2020 World Health Organization (WHO) described the outbreak as a global public health emergency and declared it as a pandemic [3, 4]. In India first case of COVID-19 was reported on 27 January 2020 in Thrissur, Kerala [5]. After those significant morbidities and mortalities have been observed from every district in India [6].

The number of patients in each pandemic is very high and such a high number of patients are a challenge for every branch of health care delivery system. Blood transfusion service is a key component of health care delivery system but due to this COVID-19 pandemic, it was also crippled. Due to fear of acquiring infection and lockdown the number of blood donation camps reduced which led to exhaustion of blood stocks [7]. In addition, there has been a shortage of staff and consumables, and more wastage of blood and blood products in blood banks due to illness or lack of transportation service during this COVID-19 pandemic [8].

The aim of this study to compare the blood donations, issued and wasted units of blood and their components during pre-COVID and COVID period in a dedicated blood bank of 740 bedded tertiary care hospital.

Materials and Methods

This cross-sectional study was carried out retrospectively at blood bank of tertiary care hospital of western Uttar Pradesh, after getting approval from Institutional Ethics Committee. The study was conducted on collected data of all voluntary and replacement donations, issue and wastage of blood and blood components which occurred from 1st April 2019 to 31st March 2021. For this study purpose, this duration was further divided into two periods, from April 2019 to March 2020, considered as the pre-COVID period and from April 2020 to March 2021 as COVID period. All the data regarding total number of blood donations including both voluntary and replacement donors were noted from Donor register, transfusion recipient's details from blood issue register, total number of blood donation camps organized from Voluntary blood camps register and also the Blood stock inventory including blood discard details from blood stock register were collected and analysed. Furthermore, the changes in number of blood donations, issue and wastage of blood units were examined and compared.

All blood donations were carried out according to the drug and cosmetics act 1940 and rules 1945 [9]. To ensure the safety and reduce the chance the spread of COVID infection among blood donor and blood bank staff, guidelines provided by NBTC were strictly followed and executed [10]. COVID appropriate behaviour like social distancing, wearing face mask and hand hygiene, were strictly maintained in blood bank [11]. Apart from taking prerequisite history and medical examination of donor some extra questionnaire like contact history, travel history, and COVID-19 symptoms were also done to exclude the at-risk donors. The staffs of blood bank used the proper personal protective equipment per guidelines of Government of India [12].

Statistical analysis

Collected data was transcribed into MS Excel datasheet and analysed by using SPSS (version 19) software. Study variables depending on the data type were summarized using appropriate measure of central tendency (mean) and dispersion - standard deviation (SD). Categorical variables were expressed as frequencies and percentages. Pearson's Chi-square test was done for comparison of categorical variables. Value of $p \leq 0.05$ was considered statistically significant along with the 95% confidence interval for the test statistic was computed.

Results

The total number of blood donations was found to be 2818 from April 2019 to March 2021. Out of this 1818 donations were during pre-COVID period (April 2019 to March 2020) and 1000 donations occurred during COVID period (April 2020 to March 2021). The mean(±SD) of collected blood units per month in pre COVID was 151.5±73.46, while during COVID-19 it was 83.33±36.79 with the p value of 0.0088 (Figure 1). A total 4036 units of blood and blood products were issued during study period. In pre COVID period 2592 units with mean value per month 216±108.46 and 1444 units with mean value per month 120.33±57.97 were issued during COVID period (p value 0.0132) (Figure 2) (Table 1).

There were overall drop-in total units of blood collected and issued units during COVID-19 period except December 2020 and from January 2021 to March 2021, where the number of blood donation and issued units exceeded from previous year blood donations (Figure 1 & 2).

The number of seropositive blood donors during pre-COVID period was 36 with mean value per month of 3±1.87 and during COVID period was found to be 24 with mean value per month of 2.17±1.62. (*p* value 0.26) (Figure 3). A total 171 units of blood/blood products (mean 14.25±24) expired and suffered leakage during pre-COVID period while these numbers were 124(mean 10.33±16.24) during COVID period (p value 0.6503) (Figure 4) (Table 2). There was no significant difference in seropositivity, expired and leaked blood units during pre-COVID and COVID period. The total number of discarded blood bags includes the number of seropositive units, expired and leaked units and those were discarded according to NBTC guideline [13]. (Figure 5)

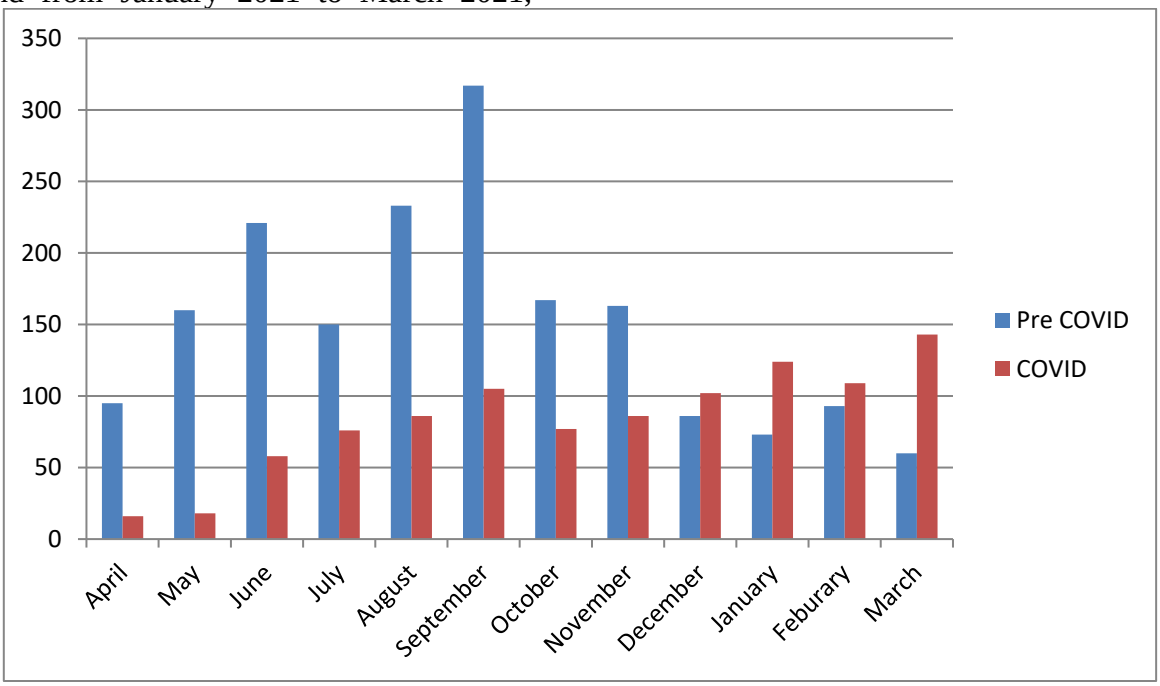

Figure 1: Showing no. of donations during Pre COVID and COVID period

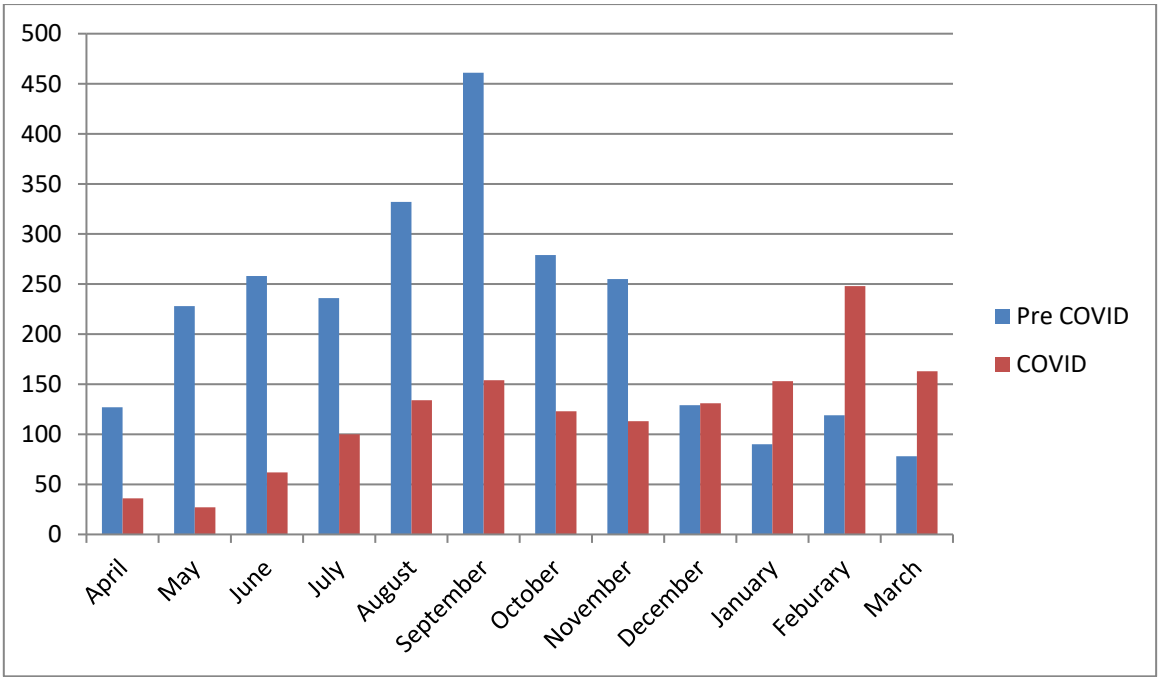

Figure 2: Showing no. of Issued blood units during Pre COVID and COVID period

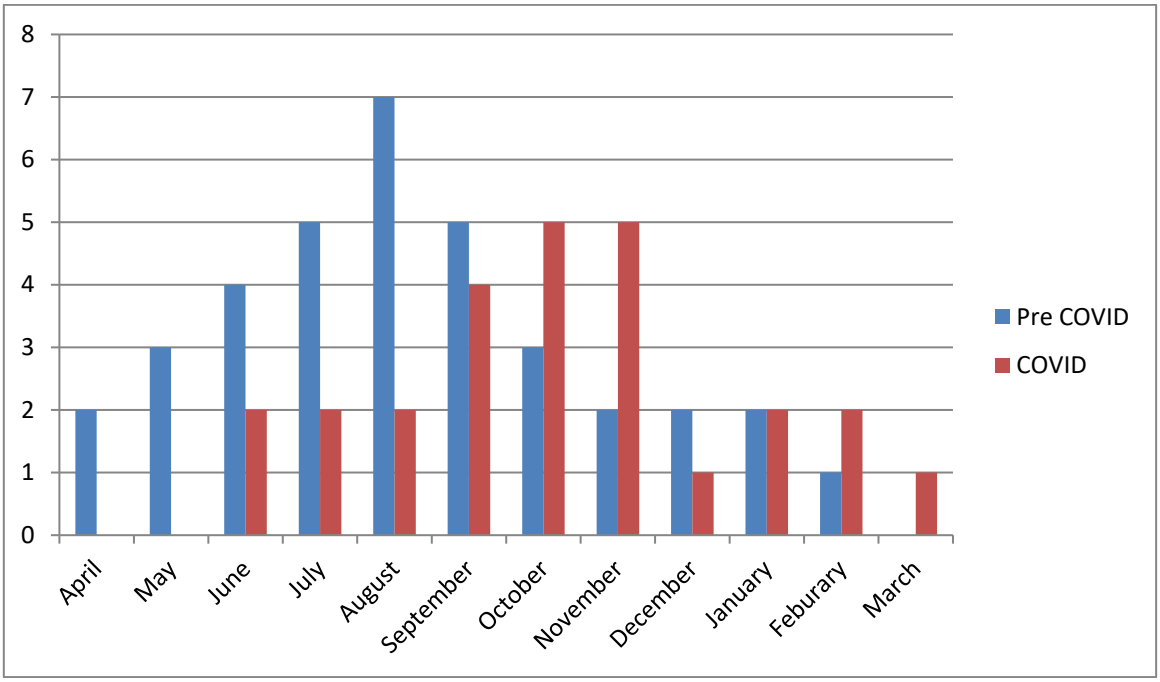

Figure 3: Showing no. of reactive donors during Pre COVID and COVID period

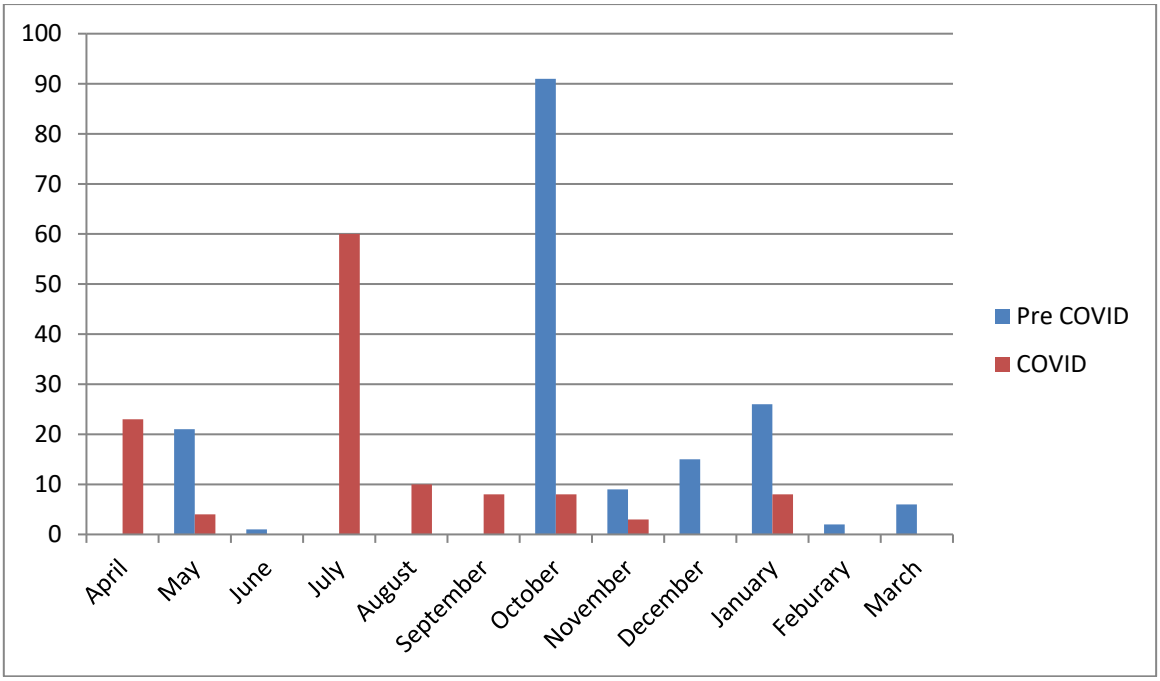

Figure 4: Showing no. of expired/leaked units during Pre COVID and COVID period

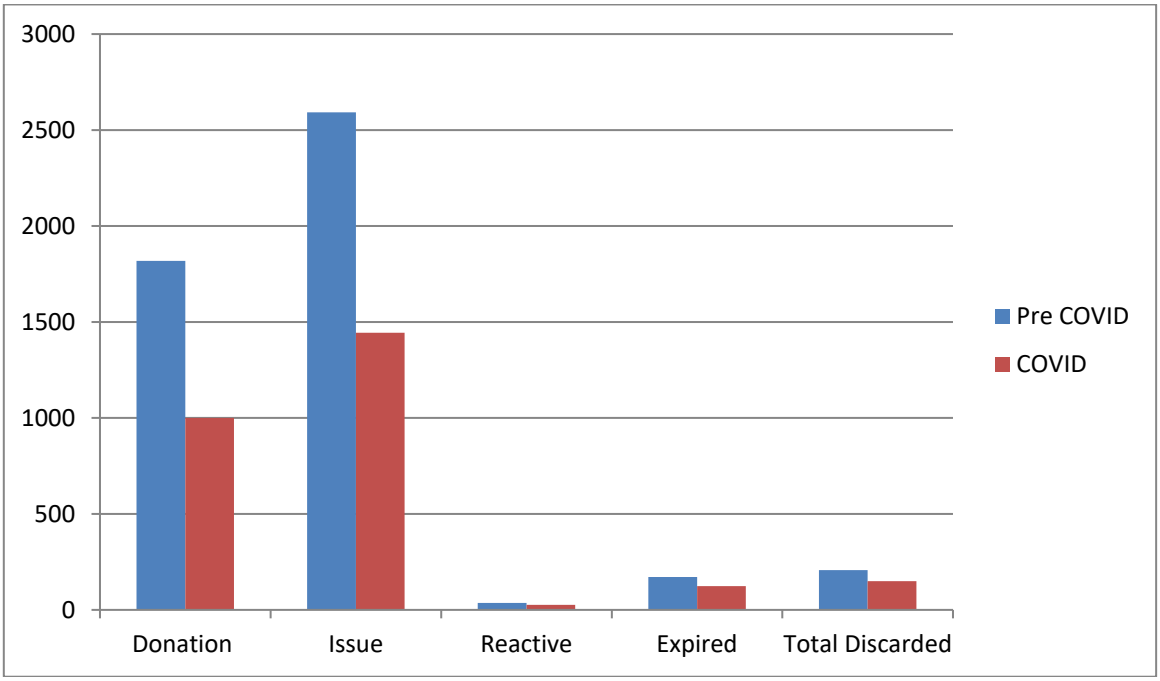

Figure 5: Comparison of Pre COVID and COVID discarded blood units

Table 1: Showing no. of Donations and Issued units during Pre COVID and COVID period

Month	2019-2020(Pre COVID)		2020-2021(COVID)	
	Donations	Issue	Donations	Issue
April	95	127	16	36
May	160	228	18	27
June	221	258	58	62
July	150	236	76	100
August	233	332	86	134
September	317	461	105	154
October	167	279	77	123
November	163	255	86	113
December	86	129	102	131
January	73	90	124	153
February	93	119	109	248
March	60	78	143	163
Total	1818	2592	1000	1444

Table 2: Showing no. of Donations during Pre COVID and COVID period

Month	2019-2020(Pre COVID)		2020-2021(COVID)	
	Reactive	Expired/Leakage	Reactive	Expired/Leakage
April	2	0	0	23
May	3	21	0	4
June	4	1	2	0
July	5	0	2	60
August	7	0	2	10
September	5	0	4	8
October	3	91	5	8
November	2	9	5	3
December	2	15	1	0
January	2	26	2	8
February	1	2	2	0
March	0	6	1	0
Total	36	171	26	124

Discussion

Blood transfusion service is one of the core components of the health care delivery system which has been adversely affected during COVID-19 pandemic. Blood is a putrescible in nature and at proper recommended temperature shelf life of RBCs, platelets and fresh frozen plasma are 35-42 days, 4-5 days and 1year respectively [14-16]. Blood can't be synthesizing artificially, so blood donations is the only way to replenish the stock of blood and blood products.

It has been observed by almost all blood banks that blood donations and working hands of staff personals decreased and wastage of blood products increased during COVID-19 pandemic [17]. Due to lockdown in country, prohibition of mass gatherings by the Government and adaptation of COVID appropriate behavior, many blood donation camps were cancelled which were previously planned in different colleges, residential complexes, and large employment campuses [18,19]. Healthy persons were apprehended to come in contact with

health care facilities and blood banks, due to fear of acquiring COVID infection [20-22]. In a study 7 donors were pointed out by Kwon SY et al as COVID-19 confirmed cases after blood donation. Out of total 9 recipients of 8 recipients of that blood/blood product did not develop any COVID-19 related symptoms while 1 recipient died due to causes unrelated to COVID-19 [23].

A decrease in blood donation and issuing units of blood and blood products was also observed in our study during COVID-19 period. Blood donations dropped by 45% as compared to previous year. During COVID 19 pandemic low patient occupancy in the hospital was observed due to deferral of nonemergency surgeries and interventions, safeguarding of high-risk patients and avoidance of coming in contact with health care facilities by patients themselves. Therefore, there was the substantial curtailment in demand of blood/blood products [24, 25]. Comparing from previous year the issuing of blood and blood products were dropped by 44.3% at our blood bank. Different studies are also suggested the reduction in both the blood donation and issue of blood units in the COVID pandemic [26-28].

It was a challenge to all blood banks to maintain the buffer stock of blood/blood components, provide blood to all recipients and ensure a rational blood transfusion by coordinating with clinical staff [29]. Various measures had been implemented by state and national government to increase the blood stock by continuous motivation of public to donate blood and cut down the difficulties faced by voluntary donors due to permitted activity during lockdown [6,10,22]. In emergency situations blood was arranged from neighboring blood banks due to unavailability of particular blood group.

In COVID-19 like pandemic situation where all sectors of different systems are facing different challenges globally, a plan of action is necessary for smooth running of healthcare organizations [30]. To ensure adequate reserve in blood banks and safe supply of blood/ blood components, protocols has been given by WHO (World Health Organization) and NBTC (National Blood Transfusion Council) [7]. In collaboration with NGOs, social workers and health care workers, general public has been educating and creating awareness about benefit of blood donation.

Conclusion

COVID-19 pandemic had a negative impact on health care delivery including blood transfusion services. To encounter the acute shortage of blood supply, maintain stable reserves and ensure availability of safe blood to the patients an emergency preparedness plan is necessary. Different guidelines given by national and international authorities must be followed by blood banks.

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