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Original Research Article

Impact of COVID 19 pandemic on blood transfusion services at a rural based district Hospital Blood-Bank, India

Divya N S[1,*], Vanishree H R[2], Sharat Kumar B Jaikar[3]

[1]*Dept. of Pathology-Blood Bank, Chamarajanagar Institute of Medical Sciences, Chamarajanagara, Karnataka, India*
[2]*Dept. of Pathology, Chamarajanagar Institute of Medical Sciences, Chamarajanagara, Karnataka, India*
[3]*Dept. of Medicine, Chamarajanagar Institute of Medical Sciences, Chamarajanagara, Karnataka, India*

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ABSTRACT

Background: The timely availability of safe and quality blood is a lifesaving decisive factor. Maintaining a stable and adequate blood supply has become a huge challenge amidst COVID 19 pandemic, especially in developing countries like India. Impact of this pandemic on blood transfusion services and potential challenges faced are discussed in the present study which helps planning acute blood shortage even in future pandemics.

Objective: 1. To know the impact of COVID-19 pandemic on Blood bank service; 2. To suggest strategy to tackle acute crisis of blood in future disasters.

Materials and Methods: In the present study six month's data pertaining to blood bank following, COVID 19 outbreak in district was compared with that of pre-COVID19 state. Donor attendance register, blood issue register, blood stock-component register, Voluntary blood donation camps, reagents and consumables stock inventory records are analyzed statistically. Mitigative measures adopted are discussed for smooth functioning of Blood bank services.

Results: During COVID-19 outbreak there was drastic reduction in total number of voluntary blood donors visiting blood bank, cancellation of Voluntary blood camps, decreased number of blood components and discard rate of blood components was increased. Disruption of inventory stock maintenance was also seen.

Conclusion: COVID 19 pandemic had a negative impact on Blood transfusion services. A multi-centric approach with evidence based emergency preparedness plan helps to overcome acute crisis of blood supply and in future disasters.

1. Introduction

Corona virus disease (COVID 19) was first detected in Wuhan, China[1] and World Health Organization (WHO) declared it as a pandemic and described the outbreak as a public health emergency of International concern, during March 2020.[1,2] In a pandemic situation like COVID 19, maintenance of adequate blood supply due to decreasing blood donations poses a real challenge to blood transfusion services as main sources of donated blood are from patient relatives, family friends and voluntary blood donors from voluntary blood donation camps.

Blood and blood components are an essential part of emergency services, therefore continuous replenishment of blood supply is crucial especially for expectant mothers, major surgeries, trauma and blood dyscrasias. Proper planning of blood supply management during COVID 19 pandemic becomes necessary.[3,4] Blood bank services like total number of blood donors, voluntary blood donation camps and blood stocks have drastically reduced due to pan-lockdown effect and cessation of blood donation camps for fear of acquiring infection.[5] Not only blood there is acute shortage of blood supply but inventory maintenance of testing reagents and consumables where as discard rate

* *Corresponding author*.
E-mail address: drdivyans@gmail.com (Divya N S).

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of blood components increased and safety of health care workers are jeopardized. Therefore, there is an urgent need of emergency preparedness plan to combat this pandemic, so that transfusion requirements are successfully met and provide sufficient time to adopt as well as plan for future similar disasters. This study also address the potential challenges met by a rural based District Hospital Blood Bank where cultural taboos play a major role in hindering blood donation services.

2. Materials and Methods

This study was conducted at a rural based District Hospital Blood Bank, Karnataka State. First case reported in Karnataka was on 9^{th} March 2020.[6] Six month's data before and after COVID 19 outbreak following first reported case in Karnataka was collected. All the data pertaining to total number of blood donors including both voluntary and replacement donors were noted from Donor register, Blood transfusion recipient's details from blood issue register, total number of Blood donation camps from Voluntary blood camps register and Blood stock inventory including blood discard details from blood stock register was collected and analyzed statistically using SPSS software version 25.0 and expressed in percentages, mean and standard deviation (SD). Health status of blood bank staffs was recorded and documented by daily temperature and SPO2 checks and those who showed symptoms of COVID 19 were subjected for RT- PCR test for confirmation and referred to COVID 19 Care Center, District Hospital for further treatment.

3. Results

The volume of blood collected and issued are closely monitored and documented in Blood bank. Various effects of COVID 19 pandemic on blood donors, blood donation camps, transfusion recipients and blood stock inventory are described in detail.

Table 1: Total no. of blood donors 6 months before COVID 19 outbreak

S. No	Month /Year	Blood unit collection
1	Sep 2019	310
2	Oct 2019	315
3	Nov 2019	400
4	Dec 2019	475
5	Jan 2020	386
6	Feb 2020	175

Most of blood was collected from blood bank based collections, only few units were from self-motivated blood donation, camps were organized by local NGO's (Non Profitable Government Organization) maintaining social-distancing practices and safety protocols laid down by NBTC (National Blood Transfusion Council).The Mean +/- SD (Standard Deviation) amount of blood units collected per month before COID 19 exposure was 343.5+/- 102.5, while Mean +/- SD following 6 months of COVID 19 exposure is 195.6 +/- 68.65. There is a notable drop in total units of blood collected following COVID 19 exposure except for the month of Jun 2020, where blood units were received from neighbor city hospital based blood bank owing to acute shortage of blood stock.

Table 2: Total no. of blood donors 6 months after COVID 19 outbreak

S. No	Month /Year	Blood unit collection
1	Mar 2020	180
2	Apr 2020	149
3	May 2020	196
4	Jun 2020	330
5	Jul 2020	175
6	Aug 2020	144

Table 3: Total no. of voluntary blood donation camps conducted 6 months before COVID 19 outbreak month wise data

S. No	Month /Year	Total no. of Blood donation camps
1	Sep 2019	06
2	Oct 2019	04
3	Nov 2019	04
4	Dec 2019	06
5	Jan 2020	05
6	Feb 2020	05

Table 4: Total no. of voluntary blood donation camps conducted 6 months after COVID 19 outbreak

S. No	Month Year	Total no. of Blood donation camps
1	Mar 2020	02
2	Apr 2020	03
3	May 2020	02
4	Jun 2020	02
5	Jul 2020	01
6	Aug 2020	00

Voluntary blood donation camps have drastically reduced following COVID 19 pandemic, therefore mobile blood drives at donor homes and blood donation camps were arranged with the help of co-operative organizations. The Mean +/- SD of total blood camps before COVID 19 exposure was 5+/- 0.8, and 6 months' post exposure was 1.75 +/- 1.25 respectively.

There is a gradual decrease of monthly Red cell stock inventory as well as Platelet concentrate expect in the month of June 2020, following post COVID-19 exposure.

Total units of Blood discarded were also increased due to COVID 19 outbreak resulting in less number outpatients visiting to District Hospital and cancellation of elective

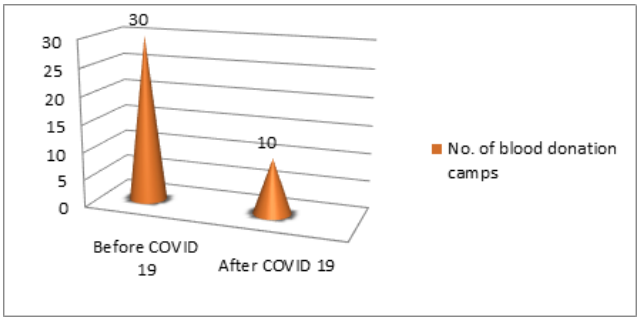

Fig. 1: Total no. of blood donation camps

Table 5: Blood stock inventory (RBCs and Platelet concentrate) 6 months before COVID 19 outbreak

S.No	Month Year	Red blood cell stock	Platelet concentrate stock
1	Sep 2019	300	74
2	Oct 2019	295	58
3	Nov 2019	392	80
4	Dec 2019	460	88
5	Jan 2020	345	82
6	Feb 2020	170	25

Table 6: Blood stock inventory (Red Blood Cells and Platelet concentrate) 6 months after COVID 19 outbreak

S.No	Month/Year	Red blood cell stock	Platelet concentrate stock
1	Mar 2020	181	20
2	Apr 2020	138	14
3	May 2020	192	22
4	Jun 2020	298	46
5	Jul 2020	169	28
6	Aug 2020	132	12

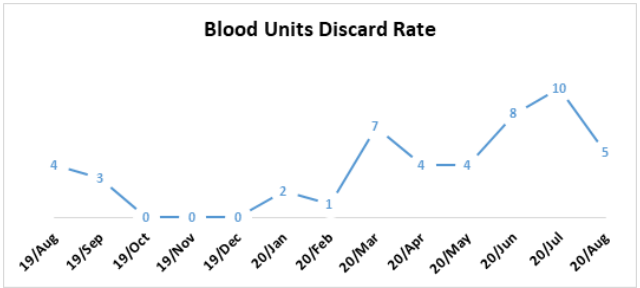

Fig. 2: Blood units discard rate

surgeries/procedures.

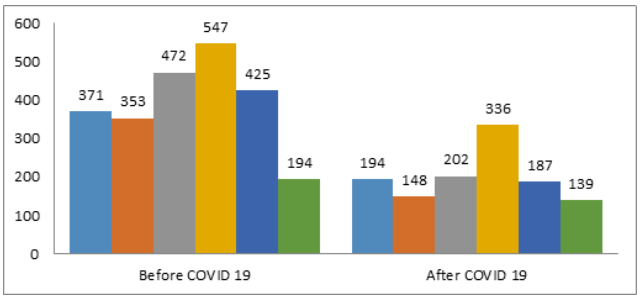

Fig. 3: Total units of blood issued from August 2019 to August 2020

Table 7: Blood units issued to emergency and non-emergency cases

Month & year	Blood units issued Emergency cases	Blood units issued to Non emergency cases
Sep 19	86	285
Oct 19	91	262
Nov 19	112	360
Dec 19	154	393
Jan 20	118	307
Feb 20	80	114
Mar 20	86	108
Apr 20	102	46
May 20	99	103
Jun 20	265	71
Jul 20	96	91
Aug 20	103	36

Six months Mean +/- SD of blood units issued before COVID 19 is 393.6+/- 120.5 and after six months is 201+/- 70.8. There is a significant drop in blood units issued post COVID 19 exposure. Also total number of blood units issued to emergency cases has increased owning to cancellation of elective cases and reduced number of outpatient services.

4. Discussion

The blood being perishable substance, continuous replenishment is essential as it can neither be synthesized or nor stored for a longer period. Shelf life of RBCs is 35-42 days whereas for platelets it is only 4-5 days.[7,8]

The blood bank associated with district hospital collects blood either by voluntary blood donation camps and/or through walk-ins (friends/relatives of in-patients). All the data pertaining to amount of blood collected and issued are noted. Discard rate of expired blood units are also noted.

Following the first exposure on 9th March 2020 in Karnataka and declaration of pan-lockdown in India (24th March 2020), there has been a significant reduction in total number of blood donations in our study, mainly due to

the fear of exposure to SARS COV-2 infection (Figure 1)., which is consistent with various studies conducted world-wide.[4–6,9] Also the walk-in donors do not have an easy access to the blood bank due to mobility constraints and strict measures put in place to prevent the spread of SARS COV-2 virus.[10–12]

The voluntary blood donation camps and mobile blood drives have also drastically reduced post COVID 19 outbreak (Tables 3 and 4), which could be due to cancellation of pre-planned blood donation camps because of closure of educational institutions, employment campuses and voluntary organizations, which is similar to observations made by other blood bank associated health institutions.[4,13] The psychological impact of COVID 19 and the public fear around blood donation needs to be addressed through awareness campaigns and social media.

Due to the limited shelf life blood and blood components (RBCs, platelets & fresh frozen plasma) acute shortage at the time of crisis as well as discard rate of expired overfilled unused blood products needs to be balanced.[14] The total number of RBCs and platelet stock show a decrease trend following COVID 19 pandemic (Tables 5 and 6)., while discard rate show an upward trend (Figure 2), which is mainly due to the limited shelf-life of platelets. Maintenance of block stock inventory poses a huge challenge to blood transfusion services due to shortage of blood components. Total number of blood units issued to emergency cases outraged the non-emergency cases (Table 7) owning to cancellation of elective surgeries, reduced number of out-patients and other non-emergency services which was consistent with the study conducted by Raturi. M et al.[15] Maintenance of buffer stock of blood and blood components along with the ethical issue to blood transfusion recipients and a good co-ordination with clinical staffs ensure a rational blood transfusion.[14] Acute shortage of blood supply in emergency situations can be managed by allocation from neighboring hospital blood banks. During the month of June, to tide over acute crisis, we had borrowed few units of blood from neighbor city Blood bank which is self-explanatory for the increased number of blood components in the month of June 2020.

An emergency preparedness plan is necessity for a healthcare organization, in facing pandemics like COVID 19.[16] There is an urgent need of action plan to mitigate the potential shortage of blood supply and manage the blood transfusion services efficiently. In fact WHO (World Health Organization) and NBTC (National Blood Transfusion Council) has laid down the protocols for blood bank to ensure safety blood transfusion services.[5] Other proactive measures like tie ups with NGO'S, military/paramilitary services, religious/cultural associations have to be initiated to mobilize large number of donors in short time, especially in rural areas where usage of electronic media is of limited use. Educating people and creating awareness about the availability of safe and accessible options of blood donations through appointment system and encouraging mobile blood drives for home donations are to be planned along with Government authorities.

Blood bank and Hospital administrative staff should adhere to emergency preparedness plan not only in maintaining adequate blood supply but also manage inventory stock of consumables and testing reagents efficiently through periodic quality checks and at least three months of buffer stock should be made available.

All health care workers including blood bank staff are at high risk for COVID 19 exposure. Employee absenteeism due to COVID 19 illness and quarantine isolation period are other factors contributing to disruption in smooth functioning of blood bank services.[5,17] Four out of ten total employees were infected with SARS COV-2 in our blood bank. During their absence recruitment of Hospital staffs from other department /specialties was planned out with less change overs. Strict adherence to biomedical safety guidelines and provision of PPE (Personal Protective Equipment) kits and psychological support to staffs will be of much help in a long run, even in future similar outbreaks.

5. Conclusion

Our study concluded that COVID 19 pandemic had a negative impact on total number of blood donors, voluntary blood donation camps, blood stock inventory and transfusion recipients as well as took a toll over health of blood bank staffs disrupting blood transfusion services. An emergency preparedness plan with flexible regulatory policies helps to combat acute shortage of blood supply and maintain stable reserves of blood during COVID 19 and future pandemics.

6. Source of Funding

None.

7. Conflict of Interest

The authors declare that there is no conflict of interest.

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Author biography

Divya N S, Assistant Professor

Vanishree H R, Professor and HOD

Sharat Kumar B Jaikar, Associate Professor

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